

PERSONAL COMPUTING

A Hayden Publication

August 1984 \$2.50 USA

THE DESKTOP ENVIRONMENT

HOW TO PRESENT
YOUR SPREADSHEET

ELECTRONIC MAIL
SYSTEMS THAT
WORK

THE RIGHT WAY
TO BUY A
COMPUTER

A BUYER'S
GUIDE TO
PRINTERS

Canada & International \$3.50



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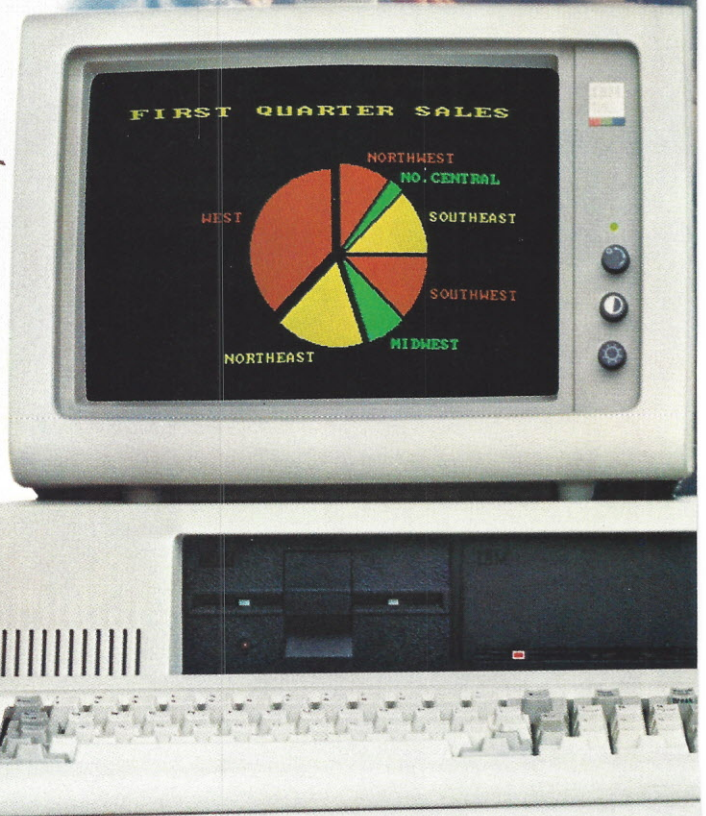
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Compare"

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DTC 2763-69-R1

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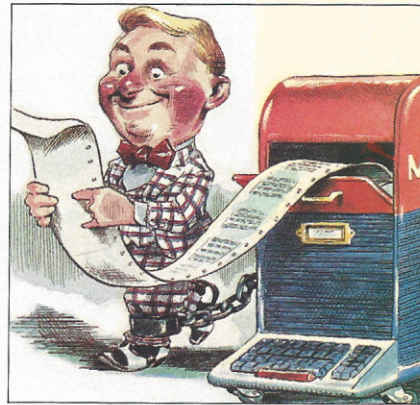
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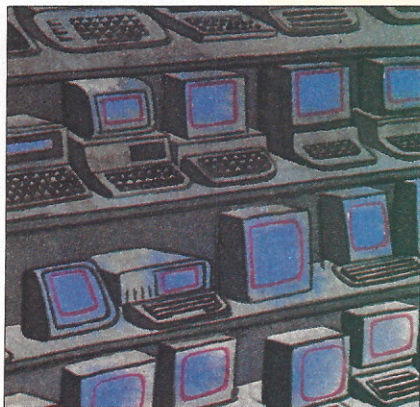
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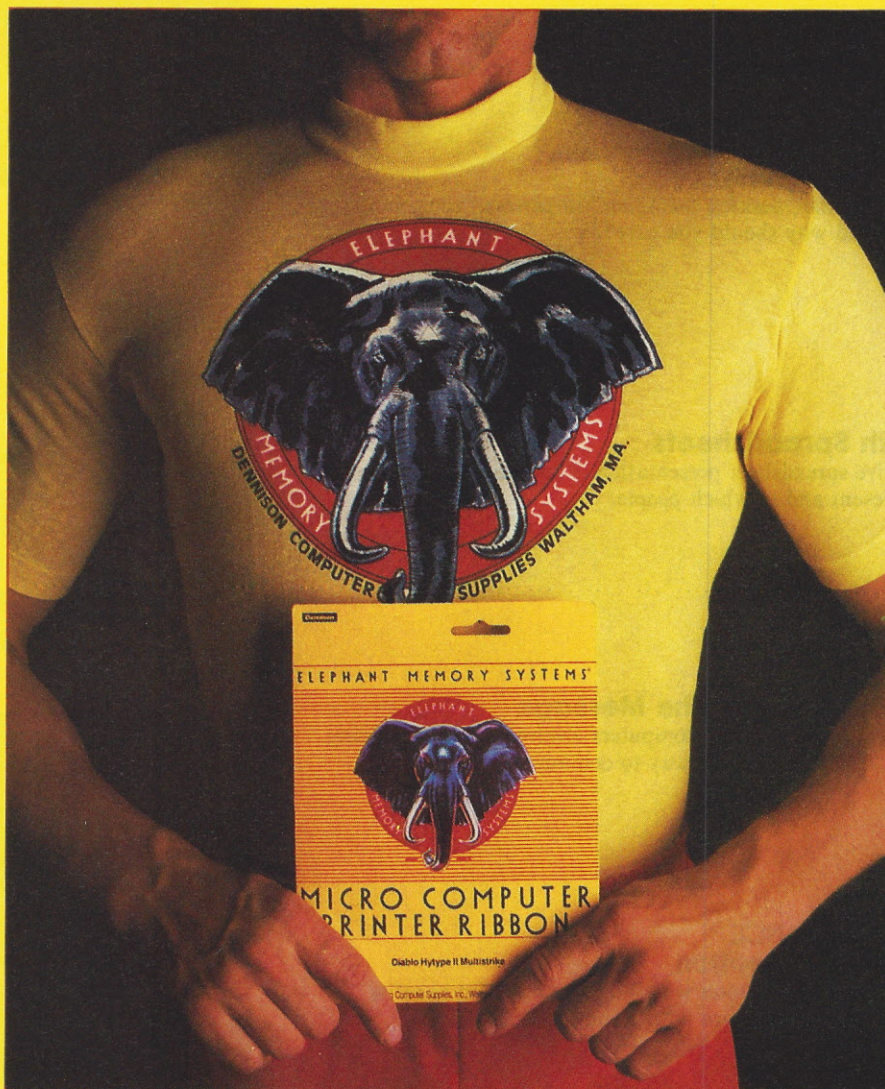
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BUYER'S GUIDE

Printing With A Personal Computer

A complete guide to personal computer printing systems, with features on word processing packages and comparison charts on dot-matrix and letter-quality printers.

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Dear Darek:

Sorry I missed your phone call. But I did receive your information about the new software, over THE SOURCE. Your instructions were crystal clear (much better than the manufacturer's!). Thanks a megabyte.

Now here's a tip for you. Try that new VR film the next time you shoot photos of the grandchildren. Be sure to take some of you and Karen, too. Love, Mom and Dad

Dear Dad:

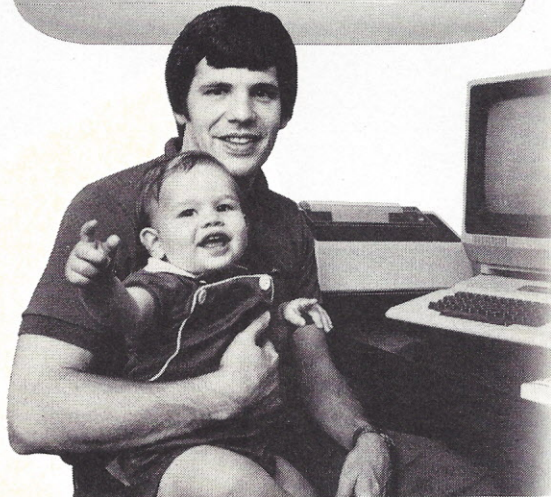
Glad I was able to help with the new software. Your advice about the film came just in time for our photo session. So you see, you're right: What you know and when you know it can be very important...I've taken enough shots of the kids to keep you and mom content for at least a week. Love from us all.

Darek

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*No compensation was provided either Senator Howard Baker or Darek Baker.



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**Available in July, 1984.

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You'll also find DisplayWrite Legal, a dictionary of about 16,000 words that a lawyer might need to check.

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Yet the biggest surprise of all may be the price.* DisplayWrite 1,** \$95. DisplayWrite 2, \$299. DisplayWrite Legal, \$165. DisplayComm, \$375.

Where you can find all four.

Get more information about the IBM DisplayWrite Series at your authorized IBM Personal Computer dealer or IBM Product Center. To find one near you, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

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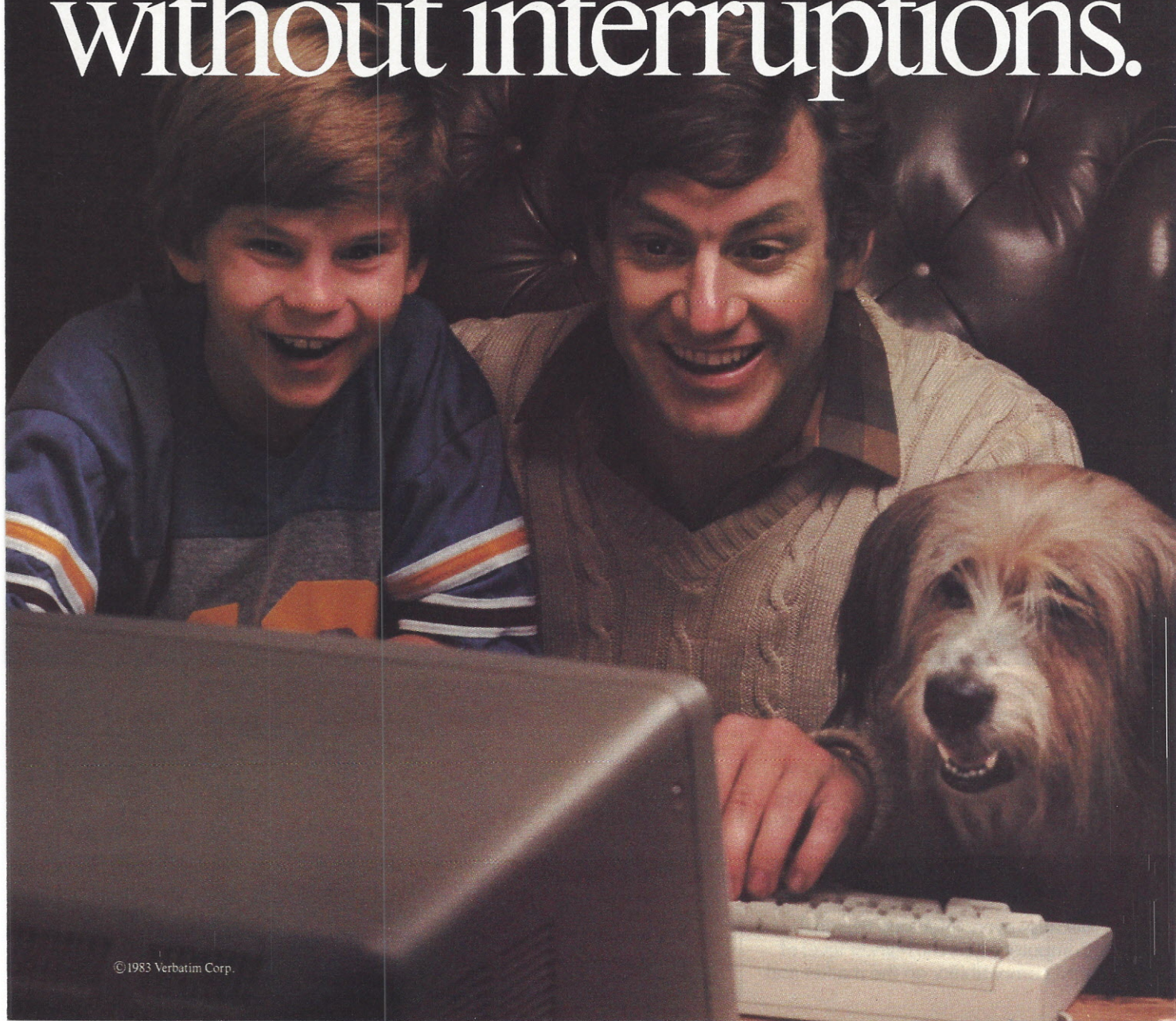
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| Features | Tele-PC | IBM PC | Tele-XT | IBM XT |
|---|--------------|-------------|---------|-------------|
| Monitor | YES | OPTIONAL | YES | OPTIONAL |
| Screen Size | 14" | 12" | 14" | 12" |
| Tilt Screen | YES | NO | YES | NO |
| Quiet Operation | YES (NO FAN) | NO | YES | NO |
| Memory | 128K | 128K OPTION | 256K | 256K OPTION |
| Graphics Display (640 x 200 resolution) | YES | OPTIONAL | YES | OPTIONAL |
| Printer Port | YES | OPTIONAL | YES | OPTIONAL |
| Communications Port | YES | OPTIONAL | YES | YES |
| MS™-DOS/BASIC® | YES | OPTIONAL | YES | OPTIONAL |
| System Expansion Slot | YES | YES | YES | YES |
| RGB and Video Port | YES | OPTIONAL | YES | OPTIONAL |

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Fewer circuit boards to cool also allowed us to eliminate the noisy, irritating fan IBM and most other PCs force you to put up with. And TeleVideo compatibles accept



THE BEST PORTABLE FOR THE BEST PRICE.

| Features | TPC II-S | IBM PC |
|-----------------------|--------------|----------|
| High Capacity Storage | YES | YES |
| Quiet Operation | YES (NO FAN) | NO |
| Display | YELLOW | AMBER |
| Memory | 256K | 256K |
| Graphics | YES | YES |
| Communications Port | YES | OPTIONAL |
| Printer Port | YES | OPTIONAL |
| MS™-DOS 2.11 | YES | OPTIONAL |

any IBM hardware options without modification.

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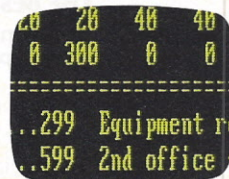


Photo of actual-size characters on Apple Monitor III.

your newspaper! And you can differentiate those characters in several modes: normal (white on black), inverse (black on white), bright intensity and dim intensity.

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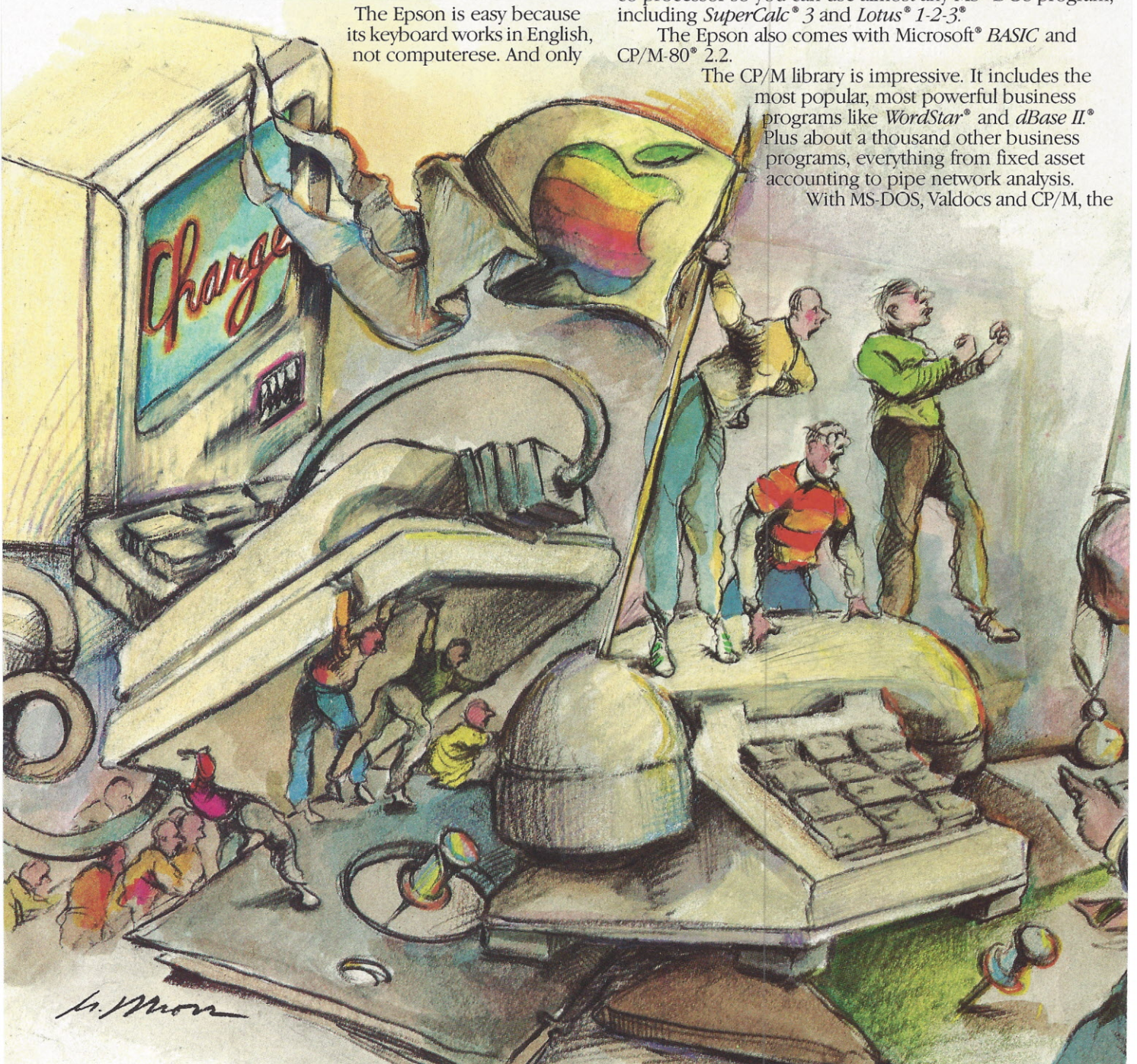
The Epson also opens the doors of your disk drives to the largest collection of software in captivity. In fact, the Epson runs *more* business programs than the IBM PC.*

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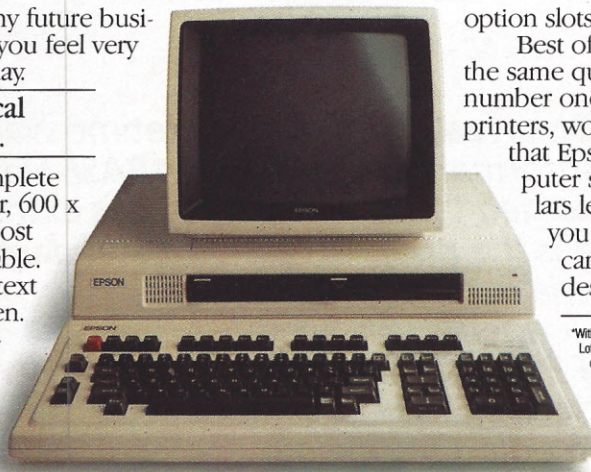
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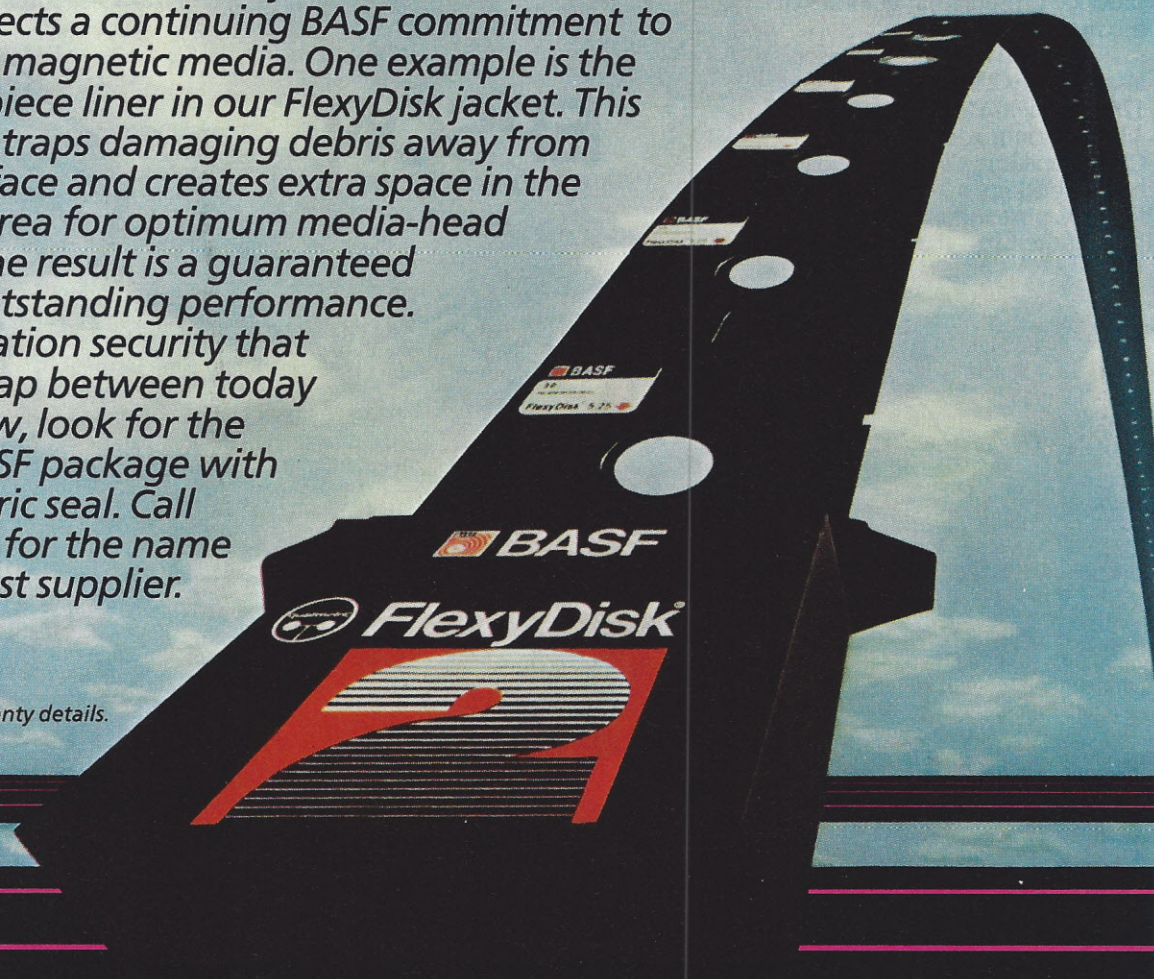
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New Products Feature Increased Power And Function

■ Deskpro ■ AppleMouse/MousePaint
 ■ Eagle Turbo XL ■ HP LaserJet
 ■ Corona PPCXT

MORE THAN JUST ANOTHER IBM CLONE

by Lisa B. Stahr, Associate Editor

There once was a time, only a few short years ago, when all a computer had to do to please its users was to look and act like an IBM Personal Computer. But as people became more familiar with personal computers they started to expect more than just close Personal Computer-compatibility; they wanted machines that could do even more than the IBM version.

This was the gauntlet thrown down to computer manufacturers and many of them were brave enough to pick it up. Within a short time there were personal computers that could outperform an IBM Personal Computer in at least one or two significant ways. The public was enthused by the introduction of the new machines, but the enthusiasm waned quickly: The computers couldn't always support the thousands of software packages and expansion boards already on the market for the IBM machine.

Compaq Computer Corp. recognized the need for a product that could claim both Personal Computer-compatibility and improved performance and set out to create a computer that could do both. The result is the Deskpro, an 8086-based desktop computer that not only is designed to support almost all of the software and add-on boards created for the IBM Personal Computer, but allows them to operate faster and more efficiently than the original.

At first glance Deskpro looks remarkably like the IBM Personal Computer, but looks really can be deceiving. Closer inspection uncovers several features that make the Compaq computer something more than just another Personal Computer-clone. Its keyboard, for example, which is similar to the one the Compaq portables use, has tactile feedback and LED indicators on the caps lock and num lock keys and its 12" monochrome monitor, 25 lines by 80 characters, is available not only in green phosphor but in amber as well.

But the biggest difference in Deskpro is in its basic system unit. The computer comes in four versions and,

depending on which model you see, can have: one half-height floppy disk drive and 128k RAM; two half-height floppy disk drives and 256k RAM; a half-height single disk drive, a half-height 10Mbyte hard disk, a serial/clock board and 256k RAM; or a half-height floppy disk drive, a half-height 10Mbyte hard disk, a serial/clock board, a 10Mbyte hard disk backup and 640k RAM.

While the 8086 microprocessor should be your first clue as to what makes Deskpro different from the Personal Computer, it shouldn't be your last. The four models (Model 1, Model 2, Model 3 and Model 4) offer more features, more flexibility and more performance than the system it ostensibly imitates, and yet remain in the mainstream of PC-/MS-DOS software.

In terms of power, Deskpro's 8086 processor ensures that the computer can outperform any 8088-based ma-



Deskpro runs almost all IBM Personal Computer Software and boards, but faster and more efficiently.



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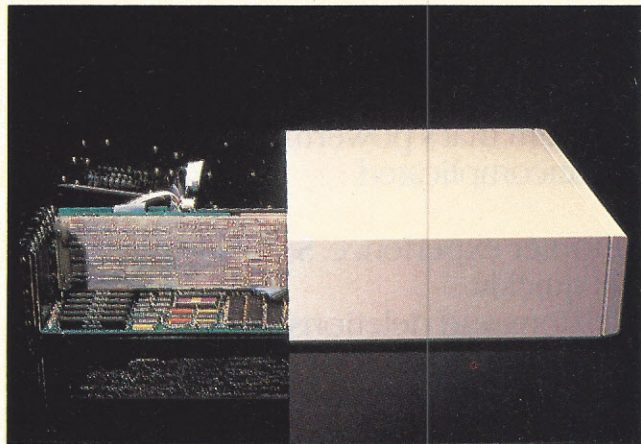
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Deskpro's main system board is easily accessible for upgrading and expansion.

chine. Although the microprocessors are from the same chip family, the 8086 can process data several times faster than the 8088. In one test conducted at Compaq, Deskpro carried out a WordStar "Find and Replace" command on a 34-page file in only 24 seconds, while an IBM XT took 40 seconds to do the same. Similarly, a recalculation of an 8320-cell Lotus 1-2-3 took Deskpro 26 seconds; the XT took twice as long.

While such speed is impressive, you can't help but wonder how much those who use the computer just for, say, word processing or creating spreadsheets will appreciate it. In these applications speed, or lack of it, is generally a human, not a machine, factor. It could be a boon, however, to people who will use graphics-oriented windowing software, such as DRI's Concurrent Personal Computer-DOS, Microsoft's Windows or VisiCorp's VisiOn, where machine responsiveness is much more likely to be noticed and appreciated.

Fast, but how compatible?

Computing speed was important to the Compaq designers, but not nearly as important as making sure Deskpro could run all of the software written for the IBM Personal Computer. That's why the Compaq desktop has two operating speeds: common and fast. The common mode, the same speed at which the Personal Computer and the other 8088-based machines operate, was required to ensure that some entertainment and data communications packages, such as Flight Simulator, could run on Deskpro without modification. The fast mode, on the other hand, runs almost all of the latest packages at the full 8086 processing speed. Although the machine automatically boots into the fast speed, users can switch between the two modes using software and keyboard commands.

With these two speeds Deskpro is said to be just as Personal Computer-compatible as its portable predecessor.

A few weeks short of Deskpro's official announcement, Compaq engineers had tested over 100 software packages, including WordStar, Lotus 1-2-3, dBASE II, and the beta test copies of Symphony and Framework, to make sure that each ran perfectly on the system. Only a handful of programs, mostly entertainment software and old versions of some applications packages, wouldn't run on Deskpro and then only in the fast mode; switching to the common mode eliminated any operation problems.

Yet software packages aren't the only Personal Computer products that Deskpro can use. The Compaq machine is compatible with Personal Computer expansion boards, too. All four models are equipped with eight expansion slots, although the video and disk controller cards in all of the models and the fixed disk controller and serial/clock cards in Models 3 and 4 pare that number down to six open slots in Models 1 and 2 and four open slots in Models 3 and 4. All models can be run with modem cards, for instance, but there are some boards, such as local area network interface cards, that only the more fully configured models (3 and 4) can handle.

Expandability

As evidenced by the several expansion slots and storage capacities offered in every model, Deskpro was designed for future, as well as present, computing needs. An inexperienced user may find the single disk drive and the 128k RAM of Model 1 suitable at first, but may later need the hard disk drive, serial/clock board, and greater memory that Models 3 and 4 can offer. Expanding the entry-level Model 1 to a Model 2 would be as easy as putting an additional 128k of RAM on the main system board and sliding another floppy disk drive into place.

While Compaq already offers an impressive array of options for the Deskpro, the option list is growing. Company officials hint at the future availability of 20Mbyte and 40Mbyte hard disk drives and a high-resolution color monitor, for instance. Compaq also has been working closely with software vendors such as Microsoft and Digital Research to stay abreast of the latest innovations in software development and to meet the challenges those innovations present to hardware manufacturers.

Deskpro probably won't steal the personal computer market out from under IBM, but it is in a strong position to try. Not only is it believed to be one of the most Personal Computer-compatible computers around, but it also offers more storage devices and special features than any of its competitors—and at very aggressive prices. At press time these prices were: Model 1—\$2895; Model 2—\$3495; Model 3—\$5495; and Model 4—\$7695. (All prices include 12" green or amber monochrome monitor.)

FOR MORE INFORMATION: COMPAQ COMPUTER CORP., 20333 FM 149, Houston, TX 77070; (713) 370-7040.

CIRCLE 301

IT DOESN'T HAVE TO BE COMPLICATED TO BE POWERFUL.



The pen has always been one of the most powerful ways to exchange information and ideas. Yet it's one of the least complicated of all tools.

PFS:WRITE is a word processing software program that's powerful enough to meet all your business writing needs. Yet it's surprisingly uncomplicated.

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WRITE was designed for people without computer experience. So all instructions are easy to understand. And you can be productive quickly.

With just a few keystrokes, you can make insertions and deletions, create bold face type, even move whole blocks of text.

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Since it's integrated with the PFS Family of Software, WRITE also gives you the power to produce personalized form letters when used with PFS:FILE. And with PFS:GRAPH, you can produce a variety of graphs within the body of any document.

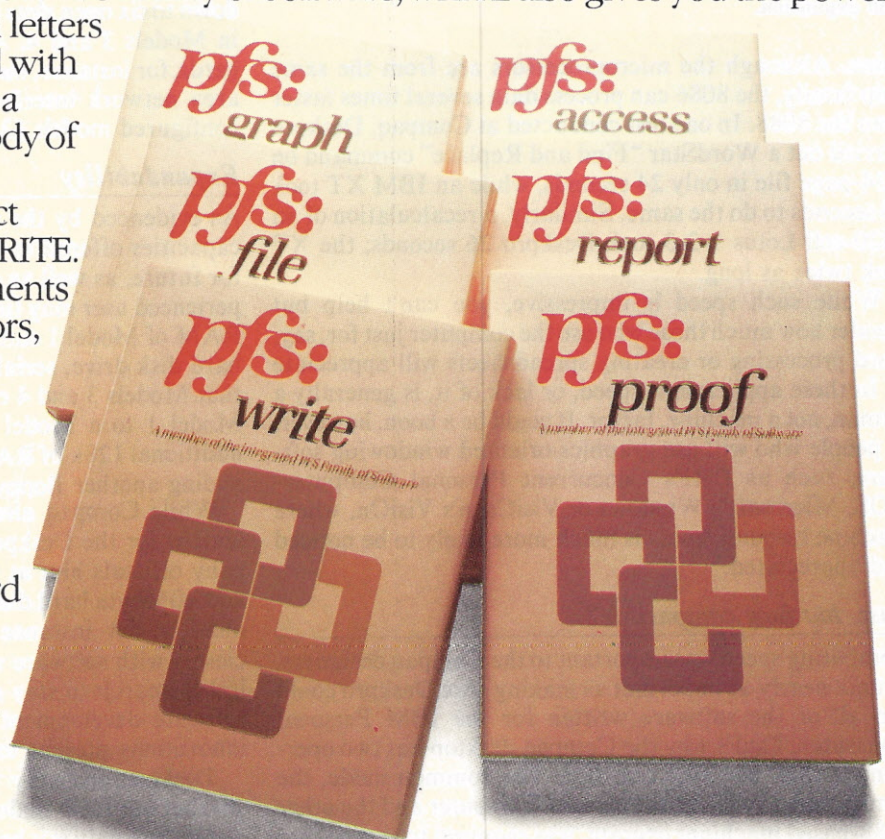
PFS:PROOF* is the perfect companion program to PFS:WRITE. PROOF checks WRITE documents for spelling, typographical errors, irregular capitalization and repeated words. And makes the necessary corrections for you.

All with just the touch of a key.

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PFS SOFTWARE THE POWER OF SIMPLICITY

PFS:WRITE currently works on IBM® and equivalent personal computer systems, Apple® IIe and Panasonic. *PFS:PROOF will be available for IBM and equivalent personal computers in June. © Software Publishing Corporation.

**DRAWING COMBINATION STRETCHES
THE APPLE II SERIES**

by Lee Thé, Associate Editor

The AppleMouse/MousePaint bundle not only hands you a tool that can provide you with professional-quality images, but includes a double fistful of tricks to ease the flow of images from your mind to the computer's screen and on to the printer's output.

AppleMouse/MousePaint comprises a mouse input device, an interface board for your Apple II series computer (if needed) and MousePaint, a versatile drawing program with productive, educational and recreational applications for both beginners and experienced computer owners. The program runs on both floppy-based systems and on the new ProFile hard disk drive for the Apple II. If you've seen the remarkable MacPaint drawing program demonstrated on the Apple Macintosh computer, MousePaint gives you about 75 percent of MacPaint's capabilities and shares MacPaint's "look" and feel—all for \$150 (\$100 on the IIc).

Now that should fire your imagination, for Apple has just given us a great little equalizer—between people with an over-\$3000 computer budget (for things like a Macintosh with MacPaint) and those with an under-\$2000 budget (for things like an Apple IIc with the mouse and MousePaint); also between those with and without drawing talent.

If you've got the patience, MousePaint will allow you to get your images down on paper, regardless of your drawing skills. You can show sharp sketches, for instance, of office layouts—and move around the images of the furniture and equipment within the overall image; you can make charts and graphs with text annotation, print them out and photocopy the results into "windows" you made in your report; you can create your own letterhead for notes and memos, and change it at will; or you take the requisite time to produce a detailed, exploded parts diagram it would take thousands of words to even begin to describe.

The mouse comprises a small box riding on a roller ball with a rubbery coating. It has a clicker button set into the sculpted plastic shell, and a "tail": a long shielded (no TV interference) beige cable connecting it to the computer. Put your hand over the mouse—it sort of snuggles into the palm. Give it a space about a foot square on either side of your computer (left-handers take note) to play in.

When you turn the system on you are presented with the choice of the tutorial or the program itself. Go to the tutorial; it shows you how to work the mouse. As you roll the mouse, so moves the pointer. Pushing the clicker chooses whatever the pointer rests on (like a choice between two type styles on a menu).

The tutorial also shows you how to work the pull-down menus. Each consists of a word in a box at the top of the

screen. Moving the pointer over the box and clicking the mouse makes a multichoice option menu "drop down" from the menu box—like pulling down a window shade. Continuing to hold down the clicker, you move the mouse/pointer down the menu to your selection—say, the "Athens" type style. As you cross over each choice the background turns dark. Release the clicker over a choice and it is immediately implemented. Move the mouse/pointer away from the choices and release the clicker and everything reverts to the previous state of affairs without any changes.

After the short tutorial you go right into the program,

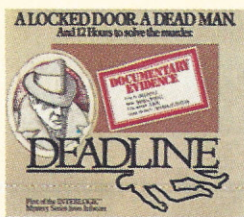
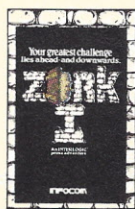


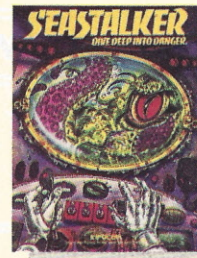
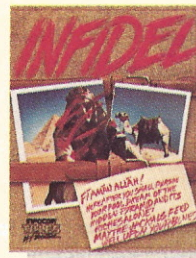
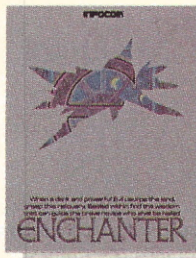
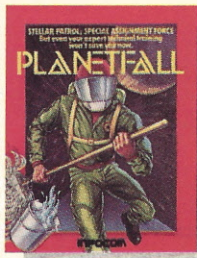
On-screen are five pull-down menus (top), 18 drawing tools (left) and 30 background patterns (bottom).

which works entirely from one screen. Presented are: five pull-down menus across the top; 18 drawing tools down the left side, along with a line-width selection chart; 30 background pattern selections across the bottom. Your "palette" wraps around the drawing area proper, which shows about three-quarters of the actual image at once (though a "show picture" command in one of the pull-down menus lets you see the whole thing at once).

Here's a hint for starting to draw: MousePaint includes one completed image—the exploded view diagram of the mouse hardware you see on the front of the manual. Move the pointer over to the pull-down menu labeled "File" and select the "Get Picture." The program will ask you for the file/picture's name. Write "MOUSE.PIC".

Take the grabbing hand and move the image around in





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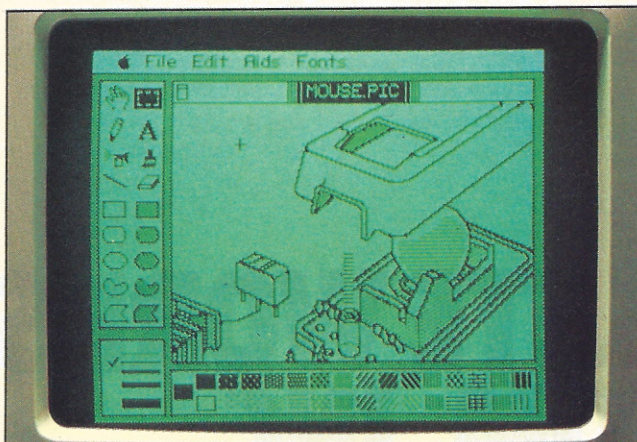
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For your: Apple II, Atari, Commodore 64, CP/M8*, DECmate, DEC Rainbow, DEC RT-11, IBM PC* and PCjr, KAYPRO II, MS-DOS 2.0*, NEC APC, NEC PC-8000, Osborne, Tandy 2000, TI Professional, TI 99/4A, TRS-80 Models I and III.

*Use the IBM PC version for your Compaq, and the MS-DOS 2.0 version for your Wang or Mindset.

CIRCLE 39

PRODUCT REVIEWS



MousePaint has one completed image, a diagram of the mouse hardware seen on the manual cover.

your "window" so you can see all of it. Pick the Editor's Box—a shimmering, variable-sized rectangle—and box off some section of the picture you want to change. Then pull down the Edit menu, and use the Cut, Paste and Copy commands to cover the screen with replicas of that box's contents, with some of them reversed (like a photographic negative) via the Invert command, and others flipped horizontally and vertically, using other Edit commands.

Clear the screen (another pull-down menu command), pull up a fresh "MOUSE.PIC" from the disk again and use the FatBits command to show a huge enlargement of a selected portion of the screen. This command enables the shakiest artist to draw beautifully, because it lets you manipulate your image dot by dot, using your drawing tools in miniature, with a picture of the "normal-sized" section of the drawing you're working on in the upper left-hand corner of the screen.

Several tricks can help "I can't draw" types of people. A straight edge drawing tool lets you draw straight lines by moving the pointer to where you want the line to begin and end. And a grid command makes the program draw straight lines (up-down and side-to-side) as you draw with the pointer, no matter how many drinks you had before starting. And it is a simple matter to fill large portions of your drawing with various accurately replicated patterns.

You can draw by building up images with your paintbrush, pencil and airbrush (yes, it draws in clouds of dots!), using the 10 varieties of enclosed shape generators and pattern selections. You can use your pull-down menu commands to manipulate those images—shrinking, duplicating, tilting, etc., and you have five styles and sizes of text for annotating your business graph. You can also draw by roughing out what you want to see and then using the eraser in various ways to carve off everything that doesn't look like what you had in mind.

Most programs reward your efforts only after hours—or even months—of learning time. But you'll enjoy yourself tremendously while you're learning to use Apple-Mouse/MousePaint. So much so that you'll probably forgive some clunkiness that clings to the program around the edges.

MousePaint's designer decided to forego some user-friendly features in order to pack as much functionality as possible into the limits of 64k memory, single 140k disk drive storage space, and an 8-bit, 6502 microprocessor. Thus, you can't catalog your data disks from within this ProDOS-based program. You need to keep pen and paper handy to jot down your file names. You need to type on the keyboard to use some commands—an annoyance. Programs work best when they're either keyboard-intensive or mouse-intensive. Going back and forth gets tedious.

Most seriously, MousePaint only supports two printers: Apple's Dot Matrix and ImageWriter printers; the latter only with the Super Serial interface card (not needed with the IIc). Apple IIc owners will find the program costs \$50 less and runs appreciably slower than on other models of the II series, both for the same reason: While the IIc's mouse interface comes with the computer, you get an interface card for other Apple models... and that card contains a second microprocessor that speeds it up considerably.

Even on the II, II Plus and IIe, the pointer can lag a bit behind your mouse movements. That takes some getting used to. On the other hand, an accelerated II runs MousePaint with the same alacrity as MacPaint on the Macintosh. Future versions of MousePaint are likely to include the ability to make drawings in double high-resolution mode. The fairly complete manual even shows you how to write BASIC and Assembly language programs for your mouse.

MousePaint and the AppleMouse II run on any suitably equipped Apple II series computer: the II, II Plus, IIe and IIc. All must have at least 64k RAM, and any RAM card used must be able to emulate the Apple 16k language card. Owners of all but the IIc must use a special interface card that plugs inside the computer; Apple supplies the card with the mouse package.

Early Apple II models may require a different ROM, available from your dealer and user-installable. MousePaint will not run on the Apple III, but the AppleMouse will.

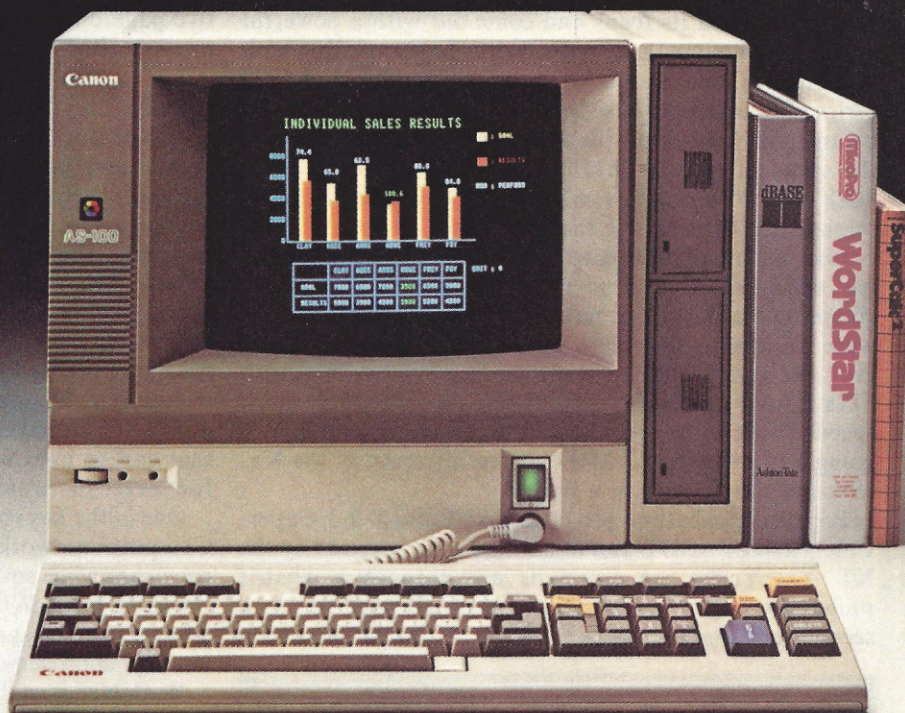
All in all, we'd rather put up with the "hassle" aspects of the program than give up any of its functionality. Apple did the right thing. And you are probably getting the fastest "picture processor" available on any sub-\$2000 computer, even as it stands.

FOR MORE INFORMATION: APPLE COMPUTER, INC., 20525 Mariani Ave., Cupertino, CA 95014; (408) 996-1010.

CIRCLE 302

Two more great reasons to buy the Canon® AS-100 Microcomputer.

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Canon Systems Division

CIRCLE 72

PRODUCT REVIEWS

EAGLE SHIFTS INTO TURBO MODE

by Robert A. Sehr, Associate Editor

In a major attempt at financial recovery, Eagle Computer has shifted its focus and come out with a powerful and fast computer that is claimed to be compatible with the IBM XT. The Turbo XL, a successor to Eagle's 1600 series of Winchester-based personal computers, is driven by an Intel 8086 chip with an 8 MHz clock, nearly twice the speed of the 4.7 MHz clock within the IBM XT's 8088 chip. You don't even have to know anything about semiconductors to judge the difference.

Like all manufacturers of IBM clones, the company has designed the unit to run large numbers of IBM-compatible software programs. Most major IBM software packages—including Lotus 1-2-3, SuperCalc and even the new integrated packages like Framework (with 512k RAM) ran easily—and faster—at the 8 MHz clock speed. However, Eagle also offers the user the option of going to the slower 4.7 MHz processing speed of the XT, with the simple push of a button.

Popular applications programs like Lotus 1-2-3, SuperCalc 3 and dBASE II ran in half the time required by the XT. The Turbo can digest its way through a what-if problem within a spreadsheet and be almost through a second such problem while the IBM XT is still processing

its first. Even a WordStar search and replace operation—normally the most time-consuming effort in word processing—is trimmed to seconds. In our own tests, it took 33 seconds to search and replace a word within a five-page document. The same task took 82 seconds on another IBM-compatible system.

Networking strategy

Since most XTs and their compatibles are sold into corporate environments used to the nanosecond access and processing times of mainframes, the high-speed processing time will be an important benefit. More importantly, the Turbo is destined to have a key role as a network file server that will take full advantage of the higher performance of the 8086.

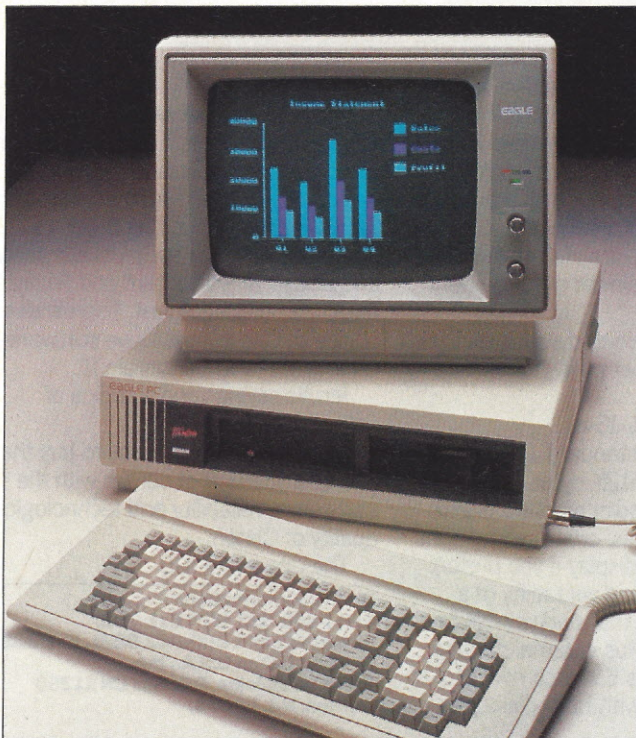
The XL is the first in a series of "Turbo" Winchester-disk based systems designed to be compatible with the company's "EagleNet" network system. The second model, the Turbo GT, offers a 32 Mbyte Winchester disk that can be used with cartridge tape backup to give the file server more storage capacity.

One of the key roadblocks in the acceptance of Personal Computer networks has been the slow processing time necessary when several processors access the file server at the same time. With an 8 MHz clock and 32 Mbytes of Winchester storage available, the Turbo demonstrates a marked improvement in performance.

EagleNet is a licensed version of Nestar's Personal Computer network system that was introduced late in 1983 in preparation for a similar network that is likely to be introduced by IBM this summer. Whether EagleNet will be compatible with the IBM network still remains to be seen.

There is no doubt that the Turbo is designed to be a serious business machine. Unlike many IBM clones, the Turbo comes with a standard Selectric-type keyboard, rather than the often cumbersome IBM Personal Computer keyboard. Even though it is a Winchester-based system, Eagle makes that function easy to use with step-by-step documentation and menu-driven utility programs. Even a first-time computer user should have no problem getting the system up and running in minutes—in fact, first-time users may have an easier time with the Turbo than some systems where they have to load one floppy after another.

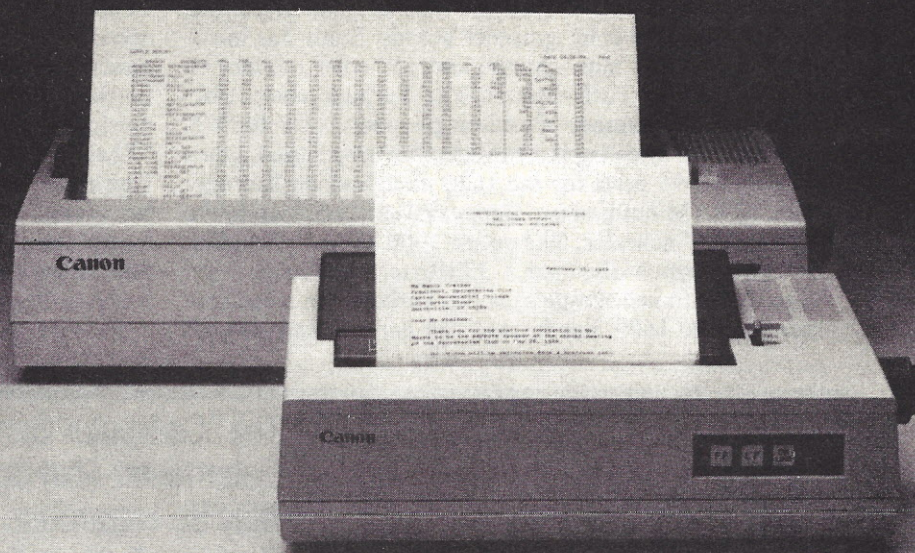
The system boots directly from the hard disk and features a menu-driven disk formatting program. The only problem is that the program is labeled with the generic "diskcopy" title, even though it is used to format new disks as well as copy disks. If one is prone to call up "format" as one does with the IBM Personal Computer, a rather distressing message comes to the screen warning: "Hit any key to format hard disk." Rather than risk losing everything on the Winchester, I chose to power down the



Driven by the 8 MHz 8086 chip, the Turbo XL plots a graph at almost twice the speed of the IBM XT.

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Canon's unique technology has also dramatically reduced bothersome clatter down to a muted noise level of less than 60dB. Even at high speed.

And that, unlike many other impact matrix printers, makes them a pleasure to work with.

Plus there's limitless flexibility with the optional down-loading function that lets you print

whatever character fonts your host computer can create. As well as a choice of four different character styles (all printable on the same line) that you can enlarge or condense.

The Impact Matrix Series Printers give you a convenient choice of special paper widths—the PW-1080A for 80-character column printout and the PW-1156A for 156-character column.

Exceptional quality and high speed.

The Canon® Impact Matrix Series Printers give you the best of both worlds.

For more information:
Call 1-800-323-1717, Ext. 300.
(In Illinois call 1-800-942-8881, Ext. 300.)
Or Write Canon U.S.A., Inc.,
Printer Division, P.O. Box CN 11250,
Trenton, N.J. 08638.

Canon Printer Division

PRODUCT REVIEWS

system—instead of hitting a key.

The Turbo XT carries the same \$4999 price tag as the IBM XT, with its standard 256k of RAM, which is upgradable to 512k. Unlike the XT, however, the additional 256k of RAM can be added on the motherboard without tying up an expansion slot. In addition to the basic 10Mbyte Winchester disk, the basic system comes with a single 360k floppy disk drive for backups and software I/O. As with the XT, the monitor is sold separately, as are monochrome and color graphics boards. Eagle has introduced a new 12" monochrome and 13" color monitor to complement the Turbo system. The Turbo is compatible with the large number of add-on peripherals for the XT.

The \$4995 price tag is a considerable drop from Eagle's original \$6995 price for the 1630 model which had only 128k of RAM but had two floppy drives in addition to the 10Mbyte Winchester. The entire 1600 series—including the 1640, which also had a 32Mbyte Winchester—has been discontinued. Eagle says the Turbo is not a replacement for the 1600, but instead "an entirely new series."

Current 1600 series owners will be offered an upgrade kit that will allow them to use the current MS-DOS 2.1 and increase the amount of standard RAM to 256k. However, the upgrade kit will not allow the 1600 user the power of the Turbo.

In a concession to the "bells and whistles" impulse buyer, Eagle has added a little extra packaging by lighting an art deco-style pink light that flashes the word "Turbo" whenever the system is in its high processing speed mode. In case this alone doesn't do the trick, financially strapped Eagle plans to market the Turbo based on the extra performance, rather than additional price-cutting, which it has done with predecessors of the Turbo. "The Turbo XL is much more than a regular Personal Computer and will position Eagle in the corporate and heavy data user marketplace," said Ronald N. Mickwee, Eagle's president and chief executive officer.

FOR MORE INFORMATION: EAGLE COMPUTER, 983 University Ave., Los Gatos, CA 95030; (408) 395-5005.

CIRCLE 303



Warning:

The "Computer Generals" Have Determined That Spray Cleaners May Be Hazardous To Your Health And Terminal To Your Computer.



That's right; dripping spray cleaners can leak down into vital electronics causing damage or failure. The potential for problems is so great that many manufacturers strongly recommend against their use. *Some even void warranties.*

Besides, spray bottles, bulky towels, etc. are a pain. Messy, hard to store.

But not **Screenwipe**! Nothing is as easy or effective as this exciting new idea. Use just once a week and you've got a clean, lint, grit and dust free screen. *And static is eliminated.* No worry about damage to screen coatings or plastic overlays either. **Screenwipe's** patented "ConcoStat G" chemical formulation takes care of it all.

Screenwipe. Easy to use, easily disposable. Like all the best systems, it's simple.

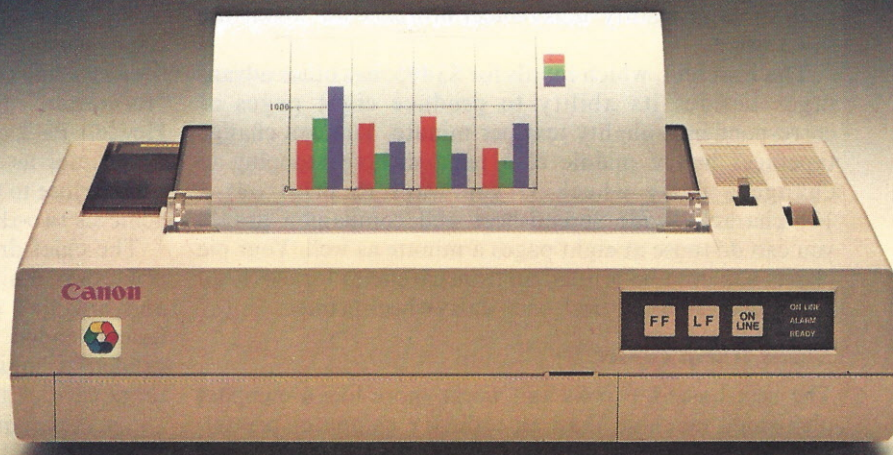
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*Patent Pending

CIRCLE 228

What's more incredible about Canon's color ink-jet printer? The quality... or the price?



Take a look at the beautiful clarity of the Canon®PJ-1080A's color ink-jet printing. Then discover that Canon's color printer actually costs well under a thousand dollars. You'll be hard-pressed to decide which is more amazing.

What makes the quality so incredible? Features like:

- The advanced drop-on-demand printing system. Canon's patented ink-jet technology gives a sharp 640 dot-per-line scan mode, for dazzling high-resolution color and exceptionally clean, crisp printouts.
- Whisper-quiet operation of less than 50dB and an impressive speed of 37 c.p.s.
- A choice of seven bold colors for bright, imaginative graphics.
- A special dual-ink cartridge system that gives cleaner

resolution on blacks and saves you money, because when black is used up only the black cartridge need be replaced.

- The ability to print high-fidelity characters and images on transparencies for overhead projection.
 - Compatibility with most computers you can buy.
- And how much does all this cost? Far less than a thousand dollars.

So what's more incredible about the PJ-1080A color ink-jet printer? There's only one way you'll really be able to find out.

And that's to buy one and decide for yourself.

For more information:
Call 1-800-323-1717, Ext. 300.
(In Illinois call 1-800-942-8881, Ext. 300.)
Or Write Canon U.S.A., Inc.,
Printer Division, P.O. Box CN 11250,
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Canon Printer Division

CIRCLE 73

PRODUCT REVIEWS

COMBINING LASER SPEED AND GRAPHICS WITH LETTER-QUALITY OUTPUT

by Kevin Strehlo, Senior Editor

If you need to print a lot of letters every day on company letterhead, the only reasonable alternative to committing a clerical person to a job which involves hours of repetitive paper-feeding and noisy printing has been to purchase a high-quality daisywheel printer, an automatic sheet feeder and a sound insulating hood.

Now there's a new option: Hewlett-Packard has packed the speed and quality of laser printing into its new LaserJet, a desktop unit that gets the job done eight times faster than its high-quality daisywheel brothers for about the same price.

The LaserJet, which retails for \$3495, has other advantages besides its ability to produce eight pages of correspondence-quality text per minute. You can change typefaces in the middle of a page without stopping to change a daisy wheel. If you want to print out a 176-character-wide spreadsheet and companion graph, you can do those at eight pages a minute as well. Your pie charts can even be printed on transparencies for overhead projection. Just try *that* on a daisywheel printer.

Looks like a copier

The new LaserJet looks and works more like a compact photocopy machine than an ordinary computer printer. Just as with a copier, you have to turn the LaserJet on and listen to its fan hum for a minute or two before you can print, and when printing, the gentle whirring of rollers is all you hear. It uses two interchangeable paper trays like those found on a copier, one for up to 100 sheets of any kind of 8½" by 11" paper, another for legal size. And if you



The Hewlett-Packard LaserJet is more like a compact photocopy than an ordinary computer printer.

open up the lid, inside you find a simple version of a copier's paper path.

There's a reason the LaserJet resembles a photocopy machine. Like other laser printers, it uses the copier's light-sensitive toner and electrostatic technology to transfer an image to a rotating cylinder, where dry ink is attracted to the image and then transferred to the paper by heat. The difference is that a copier's image is formed by light reflected off paper, while a laser printer, as the name suggests, uses a laser to draw a very sharp image of input received from the computer.

The main thing that makes the LaserJet cheaper than previous laser printers is the new Canon-developed electronic control that translates the computer's input into laser movement. To give you an idea of the kind of price breakthrough made possible by Canon's electronic "formatter," the next cheapest laser printer built by Hewlett-Packard, the HP 2687, sells for \$13,000—nearly four times as much as the LaserJet. Yet the LaserJet comes close to the 2687's typesetting quality printing and achieves two-thirds its speed.

The chief drawback of previous laser printers, besides price, was maintenance. Replenishing the ink and toner and brushing clean the coronas (exposed printing surfaces) tended to be messy, and the printed image degraded if maintenance was neglected. HP's LaserJet takes care of these problems by using a disposable cartridge that contains the ink and toner as well as all but one of the coronas necessary for the printing process. This reduces maintenance to periodic brushing of that lone exposed corona and changing the cartridge every 3000 pages or so. And while the retail cost of the cartridge is a healthy \$99 if you buy one at a time, that works out to less than Mylar ribbon costs on a daisywheel printer at about four cents a page, and quantity discounts are available.

Software compatibility

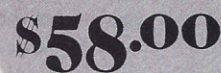
The LaserJet is supported by the latest versions of many of the most popular software packages, including Lotus 1-2-3, MultiMate, WordStar, PFS:WRITE and the BPI accounting packages. All told, Hewlett-Packard says more than 30 of the top software firms have agreed to account for the LaserJet in their automatic printer configuration routines and to take advantage of the LaserJet's extended features in future releases.

Until manufacturers begin shipping software that includes the LaserJet among printers for which it is preconfigured, however, users will have to do some fiddling themselves. To use the printer with older versions of WordStar on the IBM Personal Computer, for example, you must pick "half line feed printer" and several other choices from the printer menu in the WordStar configuration program, then customize the configuration by changing page length from 66 to 60 lines, alter the Return/Line

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CIRCLE 38

PRODUCT REVIEWS

Feed specifications, and so on. Supplementary pamphlets detail the configuration process for each of the above-mentioned programs. A computer dealer may have to help you make the LaserJet work with other software.

HP is working with major software vendors to provide access to *all* of the LaserJet features from programs like WordStar, which is currently not the case even after you have gone through the configuration process just described. You would have only two of the LaserJet's four typefaces available, for example, and would not have access to such advanced features as variable vertical and horizontal spacing, overstriking, and landscape or portrait orientation—which means images can be turned sideways on the page to give more depth or width.

Although the printer is capable of doing full-page graphics at a resolution of 75 dots per inch—comparable to an average dot-matrix printer—the only sure software support for graphics at the moment allows the printing of the screen image of an HP 150 personal computer. Eventually, however, software vendors will tap the LaserJet's

graphics features, including its ability to print text and graphics on the same page. The first implementation of this capability may be release of the new high-end integrated package from Lotus Corporation, Symphony.

So it boils down to this: The LaserJet is the fastest, quietest letter-quality printer in its price range. If you do a lot of letter-quality printing on letterhead or bond in an office, where quiet and space are at a premium, you should definitely investigate this machine. You may have to specially configure software, however, and even then all of the LaserJet's features won't be available. The day will come when software will catch up to the LaserJet and allow intermingling of graphics and several different fonts of near-typesetting quality text on the same page of ordinary letterhead or copier-compatible transparency. For now, however, the LaserJet is an attractive alternative to a daisywheel printer.

FOR MORE INFORMATION: Inquiries Manager, HEWLETT-PACKARD CO., 11000 Wolfe Rd., Cupertino, CA 95014; (800) 367-4772.

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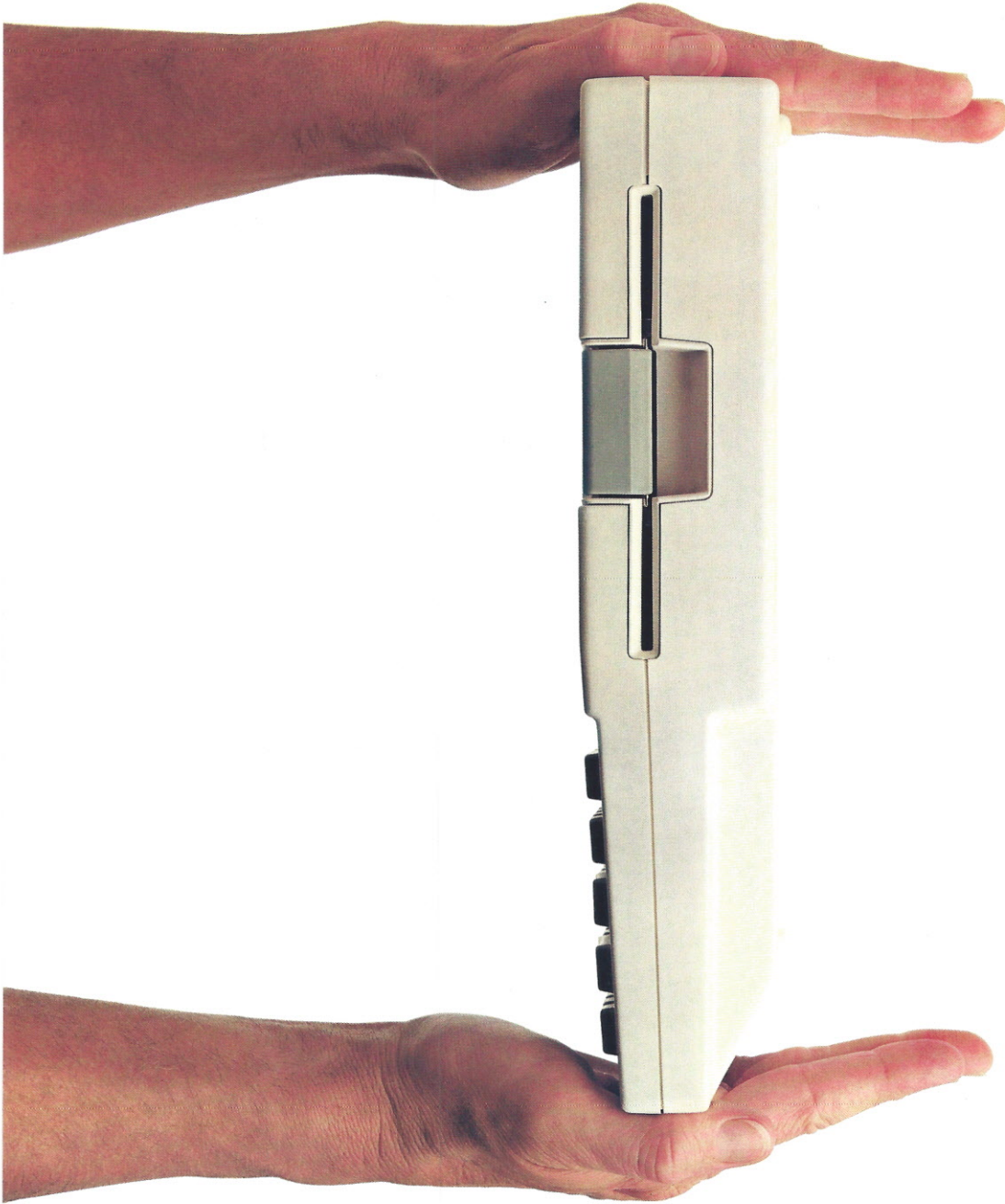
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The Apple IIc comes complete with everything you need to start computing. Including a free 4-diskette course to teach you how. An RF modulator that lets you use your TV as a monitor. And a gaggle of built-in features that cost extra on less senior machines:

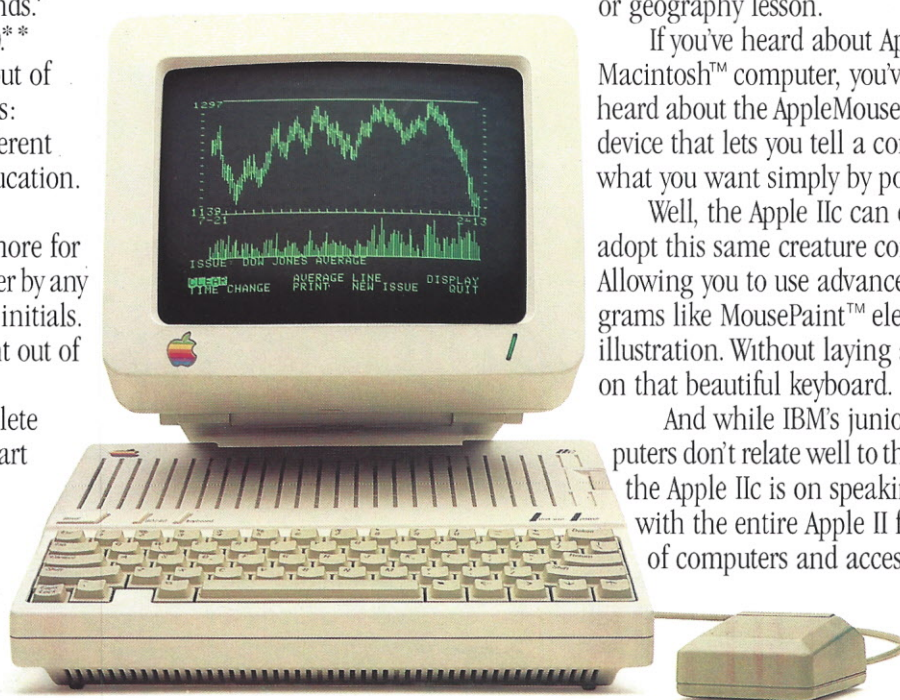
128K of internal memory—twice the power of computers twice its size.

A built-in disk drive that could cost \$400 if it weren't.

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nomically perfect as an IBM® typewriter's. Which is a lot more than computers by the same name can say.

With full 80-character display capabilities, it can show you more at once than smaller-minded computers.

And with 16 ultra high-resolution colors, it can bring any presentation to life—whether it's a quarterly report or geography lesson.

If you've heard about Apple's Macintosh™ computer, you've also heard about the AppleMouse—a little device that lets you tell a computer what you want simply by pointing.

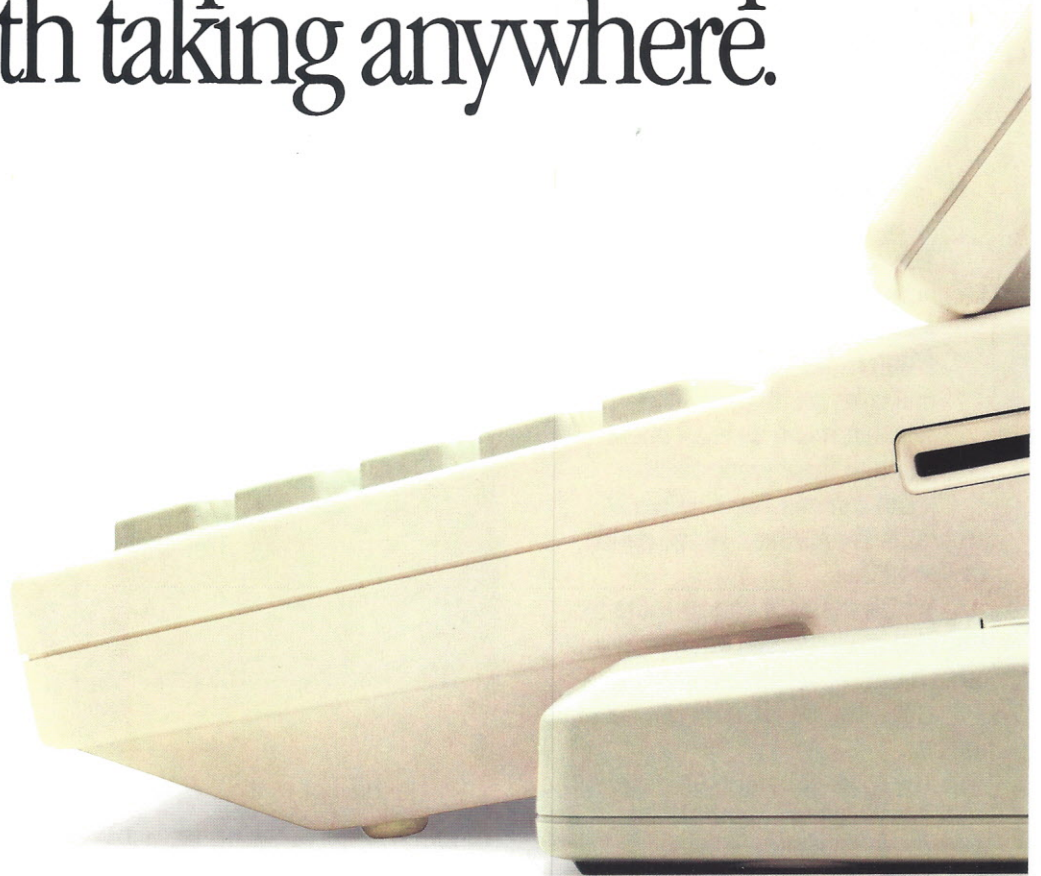
Well, the Apple IIc can easily adopt this same creature comfort. Allowing you to use advanced programs like MousePaint™ electronic illustration. Without laying a hand on that beautiful keyboard.

And while IBM's junior computers don't relate well to their elders, the Apple IIc is on speaking terms with the entire Apple II family of computers and accessories.

A family known for, among other things, advanced technology, iron-clad reliability and the world's largest library of software.

All of which makes the Apple IIc much bigger than it looks.

The first transportable computer worth taking anywhere.



The sad truth is that most small computers are pea brains. With 8 to 16K of internal memory. Displays that look like a jogger's watch. And fewer good programs than Radio Tehran.

The Apple IIc, on the other hand, has more brains and talent in its 7-1/2 pound body than you'll find in some full-size office computers.

It can run a vast library of Apple II software. Over 10,000 programs.

With a full 128K RAM, it can run advanced business software. Like AppleWorks, a 3-in-1 program that integrates word processing, electronic filing and spreadsheets.

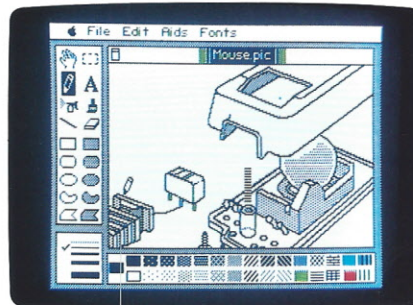
And even as we write this, seventy-nine leading software companies are writing new programs for the Apple II family. Including software that takes

full advantage of the AppleMouse.

As a matter of fact, the Apple IIc can do almost everything the IBM PC

can, and thousands of things the IBM PCjr can't.

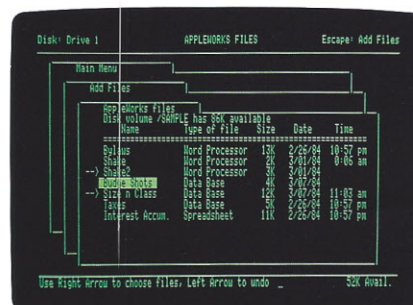
You can add an extra disk



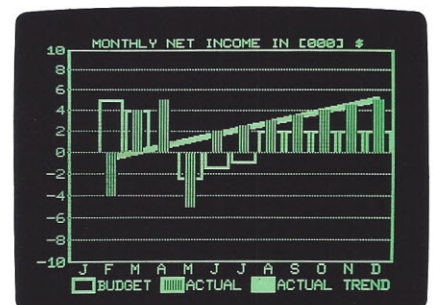
MousePaint Electronic Illustration



SubLogic's Flight Simulator II



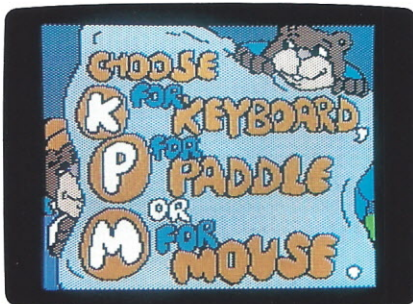
AppleWorks Integrated Business Software



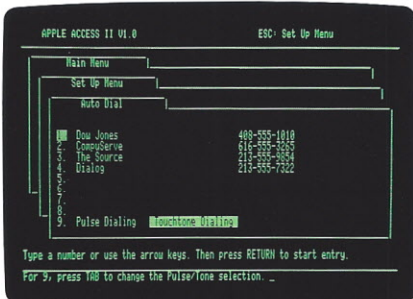
Dollars & Sense™ Personal Finance



drive so you can run advanced business software for accounting, payroll and taxes.



Stickybear Shapes™ Educational Software



Access II Communications Software

Not to mention specialized software for doctors, lawyers, contractors, farmers, brokers, screenwriters and just about every other profession that's legal.

And, of course, since the Apple II is the most popular computer in all levels of education from grade school to graduate school, the Apple II can run more educational software than any other computer in the world, save one—the Apple IIe.

Which makes the IIc the only computer that's as good for your kids as it is for you. And vice versa.

In fact, an Apple IIc can do everything you'd ever need a computer to do, sitting happily on your desk at work or at home.

But if someday you need it to do

something in some faraway hotel room, you'll remember what a superb traveling companion it can be.

It can use almost any TV for a monitor—even a hotel TV.

Or you can add an Apple IIc Flat Panel Display[†]—the very first LCD display that shows you as much information as a regular monitor—80 characters wide by 24 lines deep.

And when your work day is done and you're all alone far from home, it can do one more thing no other portable computer can do.

Play Zaxxon.™



[†]Available Fall 1984.

It gets bigger wh

As we trust we've made amply clear, the Apple IIc comes with everything you need to start computing in one box.

But once you've started, you've got a lot of ways to grow.

Because the Apple IIc comes with powerful family connections. So you can plug in things like Apple modems, printers and an extra disk drive.

With most computers, you add accessories by adding "interface cards" to the inside of the machine. They can cost up to \$150 per card. Even more if you make some egregious error installing the card.

With the Apple IIc, all those expensive interfaces are already built in. So you never have to risk messing around inside the computer—it's a sealed system. And the symbols on the back of the machine tell you exactly what goes where.

Which makes growing your system about as difficult as plugging in a toaster.

And which makes outgrowing it virtually impossible.

To an AppleMouse, Joystick or Hand Controllers.

To an Apple Modem.

To a television set.

To a monitor.



Displays of graphic power.

The IIc comes with an RF modulator that turns any garden variety TV into a computer monitor. But you'll get a better picture with one of these:

The Apple IIc 9" Monitor — high resolution green phosphor display that's a perfect match for the IIc

aesthetically as well as technically.

The Apple IIc Flat Panel Display — the first LCD display that shows you as much as most regular monitors: 80 characters by 24 lines.

Miracles of reproduction.

The IIc can drive virtually any serial printer on the market—including letter



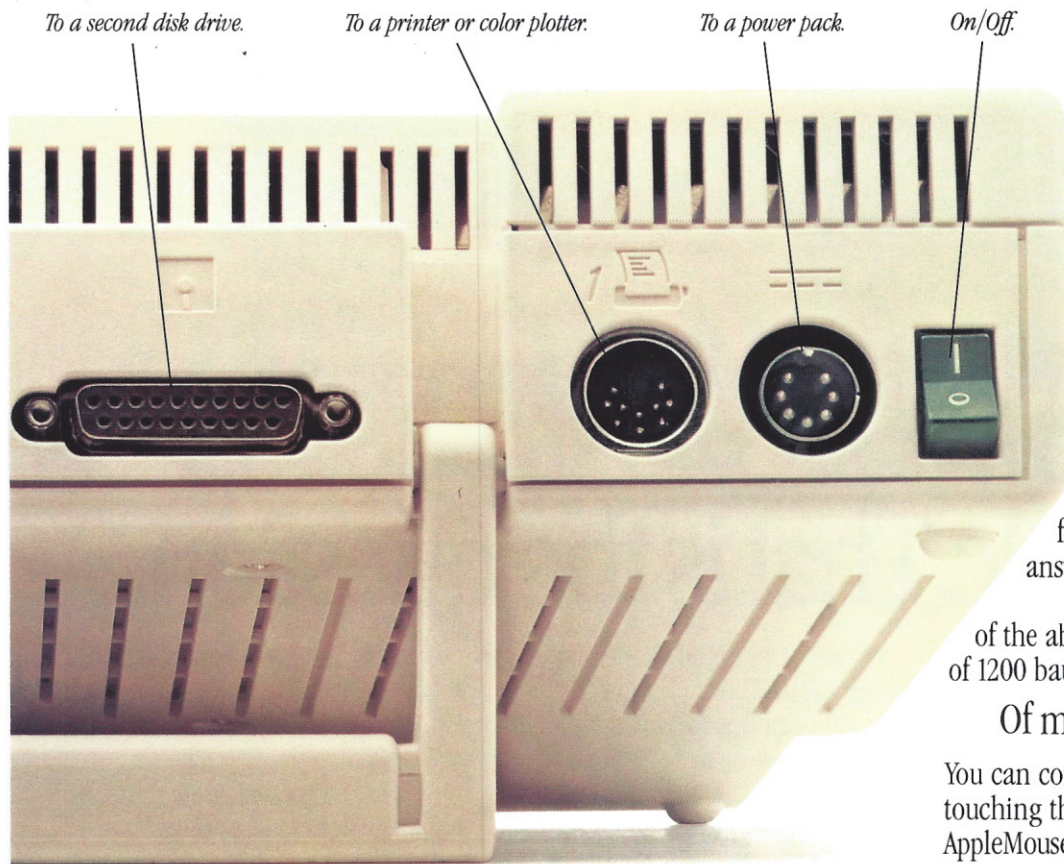
Apple IIc 9" Tilt Screen Monitor

RF Modulator

Flat Panel Display

*Scribe Printer
Imagewriter*

When you plug it in.



the lowest air fares, follow the stock market, even buy software and have it sent directly to your IIc — all over the phone. And to do all that, all you need is one of these:

Apple Modem 300 — a low cost phone link for your IIc with advanced features like auto dial, auto answer and self-test.

Apple Modem 1200 — all of the above plus high speed mode of 1200 baud.

Of mice and joysticks.

You can control your IIc without even touching the keyboard. With the AppleMouse and MousePaint software, you can create impressive electronic illustrations in color.

The AppleMouse — Replaces complex keyboard commands with point-click-cut-paste simplicity. Comes with free MousePaint program.

The Apple IIc Joystick — a game controller that's also used for many educational programs and music composition.

quality for serious business. But we offer two IIc printers and a color plotter that offer you a lot more graphic flexibility:

Scribe — Apple's first ultra low cost quality color/b&w printer. Works with any kind of paper, from bond to plain brown wrappers.

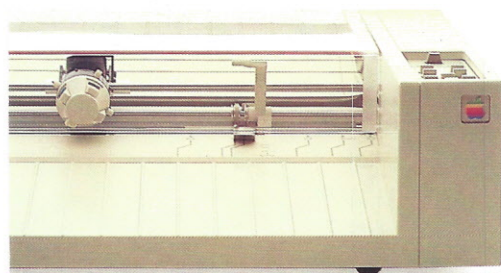
Imagewriter — Apple's high quality printer reproduces most anything

you can put on the IIc's screen.

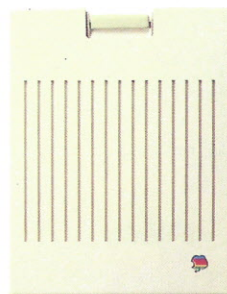
Color Plotter — Apple's incredibly compact wide bed plotter generates all kinds of graphics and illustrations in 8 brilliant colors.

Reach out and beep someone.

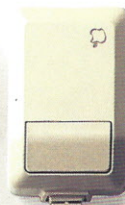
Your Apple IIc can give you a direct line to the world. Bank at home, find



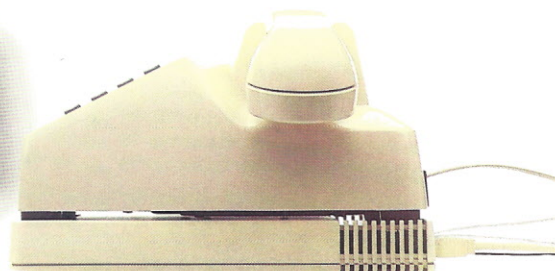
Apple Color Plotter



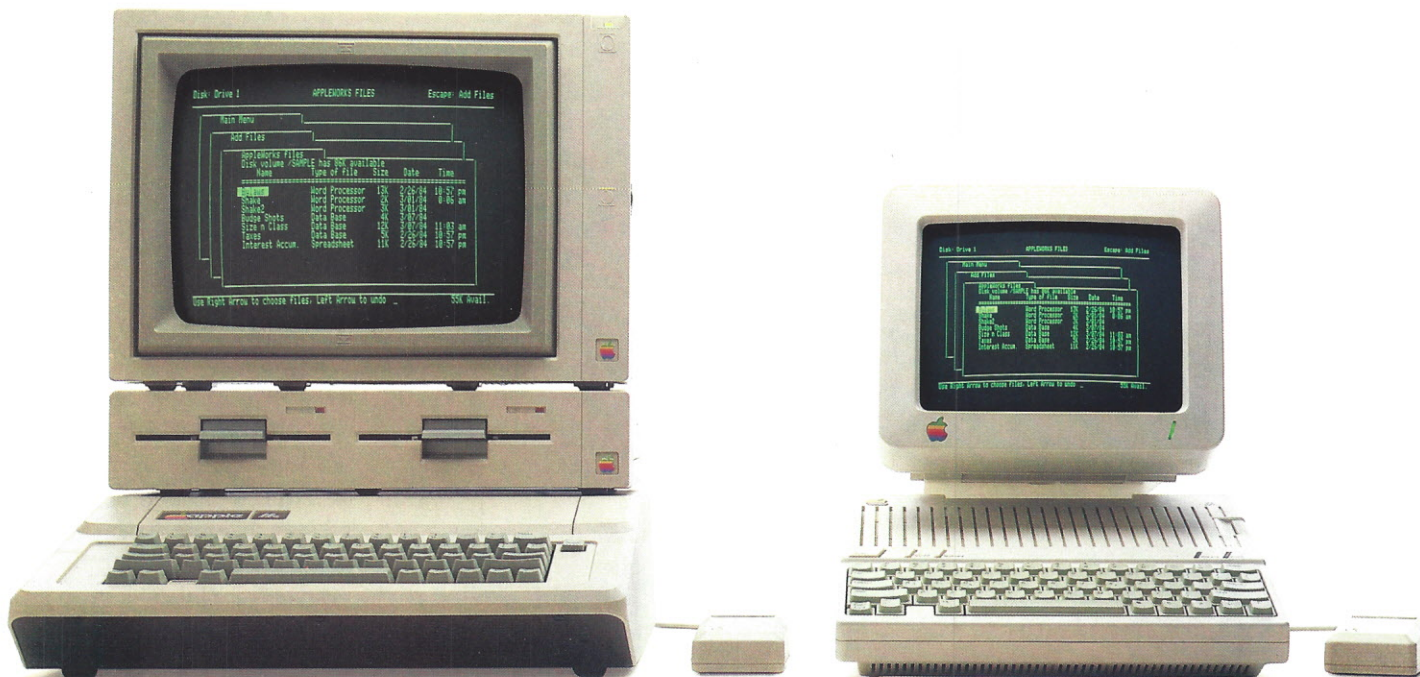
External Disk Drive



AppleMouse



Apple Modem 300/1200



Ile or Iic. That is the question.

We've spent the last seven pages giving you lots of good reasons to take home an Apple IIc.

But we don't want you to forget that our newest brainchild isn't an orphan.

Its father, the Apple IIe, happens to be the granddaddy of the entire personal computer industry.

Unlike we humans, it gets more flexible, more powerful and more innovative every year.

It can run more software than any other personal computer in the world.

There are also more accessories and peripherals for the Apple IIe than for any other personal computer in the world.

You can expand its memory to an elephantine 512K.

You can add a ProFile™ hard disk that can store up to 2400 pages. Room for all the files of a small business.

Or an unabridged history of Armenia.

In fact, you can expand the Apple IIe to do just about anything you can imagine:

Run a lab-full of test equipment. Control a base-ment-full of mainframes. Load the Space Shuttle. Give industrial robots their marching orders. Converse with dolphins. Even run IBM software.

So the only question is which II you need more:

An incredibly expandable Apple II. The IIe.

Or an incredibly compact Apple II. The Iic.

Your authorized Apple dealer will be happy to help you decide.

S/he can also help you take home your choice for as little as 10% of the purchase price. All you have to do is qualify for an Apple Credit Card.

If you haven't committed any heinous crimes lately or otherwise proved yourself a total flake, you can get one.

In about the time it'll take you to make up your mind.



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HARD DISK PORTABILITY

by Kevin Strehlo, Senior Editor

The Corona PPCXT is a solid portable that claims IBM Personal Computer compatibility, 256k of memory and 10Mbytes of hard disk storage for \$4695. The Corona also comes standard with: MS-DOS 2.1 and PC Tutor, a program to help you learn how to use that operating system; Microsoft's GW BASIC; the powerful MultiMate word processing program; a keyboard with the shift key in the correct ergonomic position and an amber display with fully formed characters; built-in monochrome 640 by 325 resolution graphics and ports for a printer and communication via a modem; software that allows you to set aside part of main memory as a RAM disk to speed the running of some programs; and three open slots that will accept a vast majority of IBM Personal Computer accessory boards.

Calling any computer that weighs more than 30 pounds *portable* may be stretching the meaning of the word. The Corona is one of a whole category of computers, including the IBM Personal Computer portable and the Compaq machines, which may precipitate a few lively moments of interchange with the steward or stewardess aboard smaller jet airliners. For example, the label portable led us to assume we could bring the Corona (9.6" by 18.8" by 19.8" in dimension) aboard a commuter flight as carry-on luggage, only to discover it would not fit beneath the seat in front of us. We were spared our stewardess' "solution," which was to charge us for an extra seat and strap Corona in, only because she discovered the flight was completely sold out. The alternative, deplaning, was under discussion when we were saved by the chance discovery of a seat under which the Corona could slip thanks to a missing piece of the seat's metal frame.

When you aren't lugging it by its sturdy metal handle or trying to stow it, the Corona seems small enough, and in fact some people may find the 9" monitor too small. The Corona's high-resolution display helps, however. Its screen allots 16 by 13 dots to form each character (compared to 7 by 9 on an IBM Personal Computer), making text sharp and easy to read. And although monitor color tends to be a matter of strong personal preference, anyone who gives Corona's high-resolution amber screen a chance will probably like it.

The resolution that allows the fine definition of individual characters on the screen is also available for monochrome graphics without the addition of an optional board like the one made by Hercules. Unfortunately this nice feature is largely wasted because, in general, software publishers have not customized their IBM Personal Computer software to take advantage of it. Framework, the new integrated package from Ashton-Tate, is one exception, using the built-in 640 by 325 graphics to ad-

vantage, and a small company in Boulder, Colo., HST Computing, has written a graphics driver that makes the Corona's built-in graphics accessible to Lotus 1-2-3, alleviating the need for the additional display card.

The Corona we tested won't make you hyperextend your little fingers in reaching for the left shift and Return keys the way the standard IBM Personal Computer keyboard does. The keyboard also adds an Enter key where an accountant might expect and welcome it, below and to the right of the 10-key pad. But it is otherwise identical in layout to the machine it clones, right down to the left-hand cluster of function keys which, logically, should stretch across the top of the keyboard where they could be labeled on the bottom line of the screen. Oh well.

Those who feel more at home on a standard typewriter



The Corona PPCXT portable includes a 9" monitor with high-resolution amber characters and graphics.

keyboard than a 10-key will welcome the red light that warns when the "Num lock" key has been accidentally engaged, the second indicator for the "Caps lock" key, and the slightly raised edge on the F and J keys to help locate the proper home position for touch-typing. Overall, the keyboard's feel, while offering no tactile or audible feedback to speak of, was pleasant enough.

In some ways, the Corona is more advanced than its IBM mentor, the Personal Computer. For example, there is space for up to 512k of memory on the motherboard plus the built-in parallel and serial ports and graphics capability already mentioned. At best, the IBM needs two accessory boards to match the Corona's built-in capabilities.

It is always a risk that when you improve on the IBM Personal Computer you will trade off some compatibility. The Corona, for example, failed to run Flight Simulator and several software packages that incorporate Softech Microsystem's P-system operating system, including the Cdex training programs. Most of the other best-selling packages ran without a hitch, including those notably

Apricot voted best in the world. But you be the judge.

This year, the Apricot won both the Microcomputer of the Year, and Business Microcomputer awards at the prestigious British Microcomputing Awards presentation.

If you've already seen it, you know why.

You also know why *InfoWorld* picked it out as being among "the most clever, inventive, cosmetically attractive and easy-to-use computers to be found."

And why *Creative Computing* believes, "Its mass of features makes it a sure thing to put a dent in the jade U.S. market."

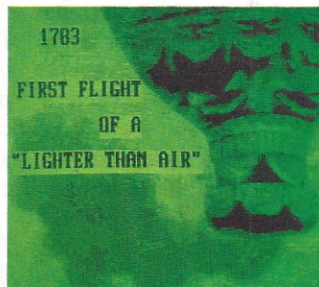
And why *Personal Computing* judged it "faster and more efficient than the IBM PC."

But if you haven't seen the Apricot, relax. It's not too late. Simply visit your local Apricot dealer or contact Micro D, national distributor of the Apricot, at 800/432-3129 in California, or 800/854-6801 outside California.

The Apricot family consists of five microcomputers, ranging from \$2295 to \$4895.



The unique MicroScreen™ serves as a calendar/clock, a built-in calculator, and a labelling device for special touch-sensitive keys.



For superior graphics, the Apricot has one of the highest resolution screens of any personal computer on the market (800 x 400 pixels).



You can carry the Apricot like a briefcase.



PRODUCT REVIEWS

tough tests of compatibility, the Norton Utilities and Lotus 1-2-3.

The case against the case

One area in which the Corona fails to improve on the competition is in the design of its case. The cap into which the keyboard fits does provide storage for the power and keyboard cords plus a floppy disk or two, and doubtless affords some extra protection for the keyboard, but makes packing up harder to do than it is for those machines whose keyboards latch directly over the top of the screen, doubling as lids. Moreover, removing the plastic casing, which we found necessary to do in order to add memory chips and to change a jumper that causes the serial port to work with a modem rather than a printer, required removing eight screws and applying a bit of body English and some verbal persuasion to get it to snap back on when we were through.

Although the bundle of software that comes with the Corona is hard to fault, there are some peculiarities you should be aware of. The MultiMate word processor shipping with the Corona is not the latest version, which means it lacks the spelling checker. And because of the private label arrangement between Corona and MultiMate, the word processing software is supported by Corona instead of the Connecticut-based software publisher itself, which means you should discount anything you had heard about the good phone support and liberal update policy for which MultiMate has been praised. While we're quibbling, we should also note that the version of PC Tutor shipped with the Corona portable did not deal with such enhanced features of MS-DOS 2.0 as the tree structure of its subdirectories, although that problem should eventually be taken care of by an update to a newer version of the software.

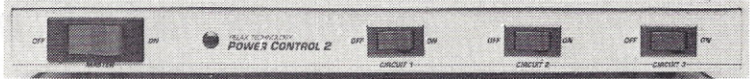
Another problem with the hard disk Corona portable we tested that may be fixed by the time you read this review is that the board controlling the hard disk in our machine was not compatible with the IBM XT. This meant our machine would not boot off the hard disk. Although the need to insert a floppy every time the machine is turned on or the program is exited abnormally may seem a small inconvenience to someone who has never used a hard disk-based computer, let us warn that hard disk access to a number of programs without fumbling with floppies quickly spoils you. It is especially nice to not have to carry *any* floppies when you take a transportable on the road. The XT-compatible controller could be delayed until late summer, and some machines will have been shipped before the new boards are completed, so it would probably pay to check this out.

FOR MORE INFORMATION: CORONA DATA SYSTEMS, 275 E. Hillcrest Dr., Thousand Oaks, CA 91360; (805) 495-5800.

CIRCLE 304

The Controller

Controls Power, Peripherals, Spikes, and Glitches.



Power Control™ protects computer circuitry and data stored in memory against the damage voltage spikes can cause.

Puts on/off control of your computer, terminal, printer, and more at your fingertips in a slim panel unit sized to fit *underneath* your computer terminal.

Contains a master switch (to turn your computer, terminal, printer, a modem or a lamp on or off at the same time) and three additional switches to turn peripherals on or off in any order you desire.

Power Control 1, 2 & 3 protect against voltage spikes caused by turning on and off of: air conditioners • power tools • furnaces • electrostatic copy machines • computer disk drives • appliances • hairdryers

Overvoltages in power lines (*caused when utilities switch lines during peak usage hours*). Undervoltages in power lines (*occur as surge following blackouts and brownouts*).

Lightning strikes (*direct hits and strikes several miles away*). Overloads, short circuits or grounding of circuit.

Power Control 2 & 3 also protect against noise interference (unwanted electrical signals) picked up and transmitted by power lines, power supply cords, and noise generated by static electricity. Sources of noise interference are: Fluorescent lights • Wiring receptacles, plugs, sockets • Radio transmission • Television transmission • Sunspot activity • Operating computers, machines • Automotive ignition systems • and the same causes of electrical spikes listed at left.

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To order, phone: 415/471-6112 or mail to: 3101 Whipple Rd., #25, Union City, CA 94587. *Calif. Residents add applicable sales tax. Prices include shipping.

☐ Power Control 1: \$69.95*

☐ Power Control 2: \$89.95*

10 amp circuit breaker. RFI noise filtering. IEC power connector.

☐ Power Control 3: \$129.95*

Cross suppression between all 4 outlets. Illuminated switches. 3-stage RFI filter.

☐ Check for \$_____ enclosed.

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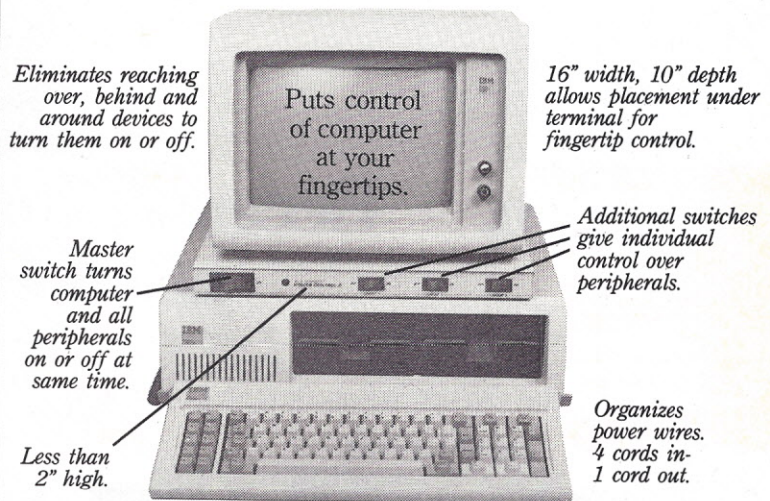
Name _____

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City _____

St. _____ Zip _____

Signature _____



CIRCLE 204

©Relax Technology. The company that works so you can relax and get down to business.

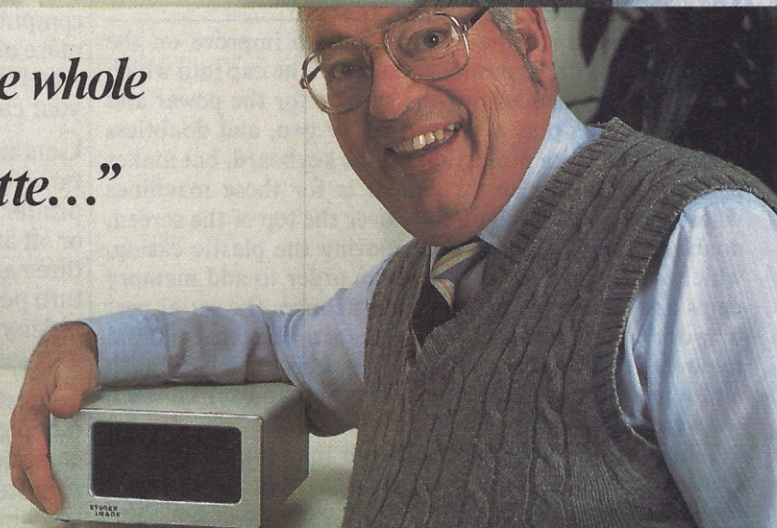
"My IBM® PC XT™ writes monthly billings and statements to Maxwell & Sons' 1,893 customers, and tells me who owes what."

When you work with a lot of information, you can't afford to re-enter every file when your hard disk fails. And no hard disk is fail-safe.



"My Sysgen Image™ backs up the whole lot in less than five minutes. 10 megabytes on a single cassette..."

The Sysgen Image backs up the hard disk in your IBM PC XT. So you can protect your files in minutes—instead of spending hours re-entering them.



"For just \$995. That's cheap insurance. It lets me sleep at night."

The Sysgen Image for just \$995. It's the most affordable insurance you can buy for your two most important assets: Your information. And your time.



Sysgen. Because a hard disk without tape just doesn't make sense.

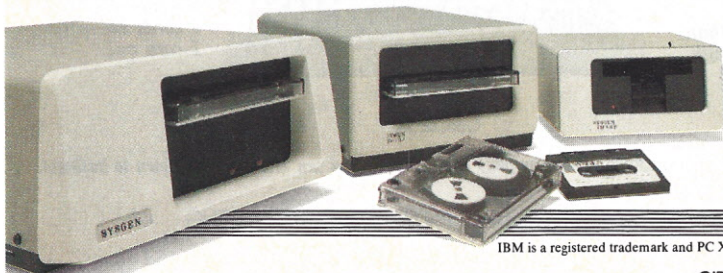
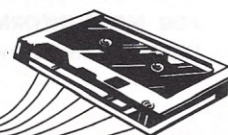
Sysgen products for the IBM® PC, PC XT, and other personal computers: Economical, 10- and 20-Megabyte hard disk systems with tape back-up. Or 10-Megabyte

tape back-up for the IBM PC XT.

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Innovative Uses Of Computer Resources

- The Candidate's Edge ■ Olympic Music
- The One-Man Office ■ The Doctor's Aide
- Traveling Companion

In The Race For Delegates

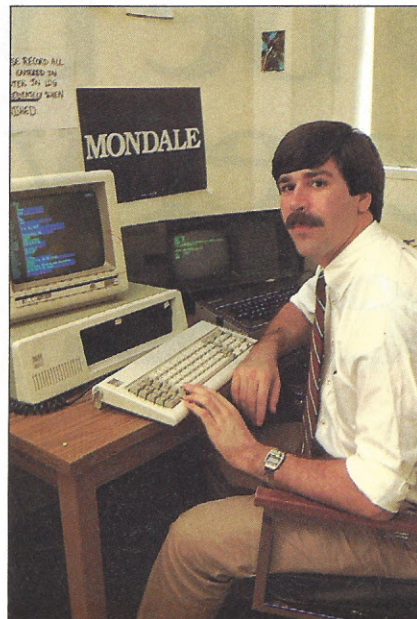
The nation's capital has always been a town whose occupants are especially keen on plugging into power sources, regardless of whether they are located in smoky back rooms or on a campaign dais. So it's small wonder that the Washington elite is heartily embracing one of the newest sources of power—personal computers.

At Walter Mondale's national campaign headquarters, located in a businesslike brick building on Wisconsin Ave. in the fashionable northwest section of Washington, D.C., personal computers have redefined the process of tracking convention delegates. In fact, they've streamlined the whole campaign mechanism, but it was in this business of wooing and winning delegates for the Democratic National Convention in San Francisco last month that the computer really proved its mettle.

"People doing delegate tracking have had a lot more time to talk with delegates because they didn't have to do all the backup tasks of sorting through information and recording it manually," says Tony Corrado, who is in charge of delegate tracking. Officially, Corrado's title reads "deputy to the national campaign manager." Unofficially, Corrado, who is 27, is finishing up his Ph.D. in 16th-century philosophy at Boston College and

practicing hands-on 20th-century political philosophy. A veteran of several campaigns, Corrado was once again lured back to Washington last January and given the task of monitoring the budget and delegates.

To appreciate just how difficult the last part of that task is, it is necessary to understand a little of what is involved in delegate tracking, a pursuit process requiring the combined talents of Lord Peter Wimsey, Sherlock Holmes and George Smiley.



Tony Corrado, 27, monitors the budget and delegates for Walter Mondale's presidential campaign.

Photograph by Cynthia Johnson

There were 3933 delegates selected to go to the convention and decide who is to run for president of the United States on the Democratic ticket. Some of these were elected in state primaries and caucuses, some selected by state politicians and U.S. congressional groups. Most of the delegates were initially committed or pledged to a particular candidate—although there are now no official bindings—but many arrived at the Golden Gate, both legally and ethically, free as birds, a situation the whole contingent would be in if there were to be more than one ballot. And, regardless of how and why they were selected, *all* of the delegates have their own special interests, idiosyncracies, demands and desires.

In the past, keeping tabs on the delegates demanded reams of paper, untold hours and limitless patience. Corrado says that at the 1980 convention, when there was a particularly thorny rules vote in the offing, the trackers had to meet every night so they could assess and hand-record each delegation's leanings. That process took three hours. With personal computers involved, the trackers were able to halve their meetings, while the time for each was shortened.

To monitor the delegates, Corrado's team—25 at full strength—initially enlisted the support of six Kaypros, four with 2Mbyte capability and two with 10Mbyte capability, and two

**Somebody
has to be better
than everybody
else.**

It's inevitable.

Somebody is always more determined.
Works harder. And winds up on top.

Take Dysan, for instance.

We were the ones who helped
develop the first 5¼" flexible diskette.

And while everybody else was trying
to figure out how to make them, we
were busy making them better.

With superior materials. A special
lubricant and jacket liner that extend
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Unique manufacturing techniques.
Like our burnishing process that helps
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commitment to quality.

What does all this mean to you?

Every Dysan diskette you buy will
record and retain all your data all the
time. For as long as you own the diskette
and treat it right.

Dysan.

We're not just like everybody else.

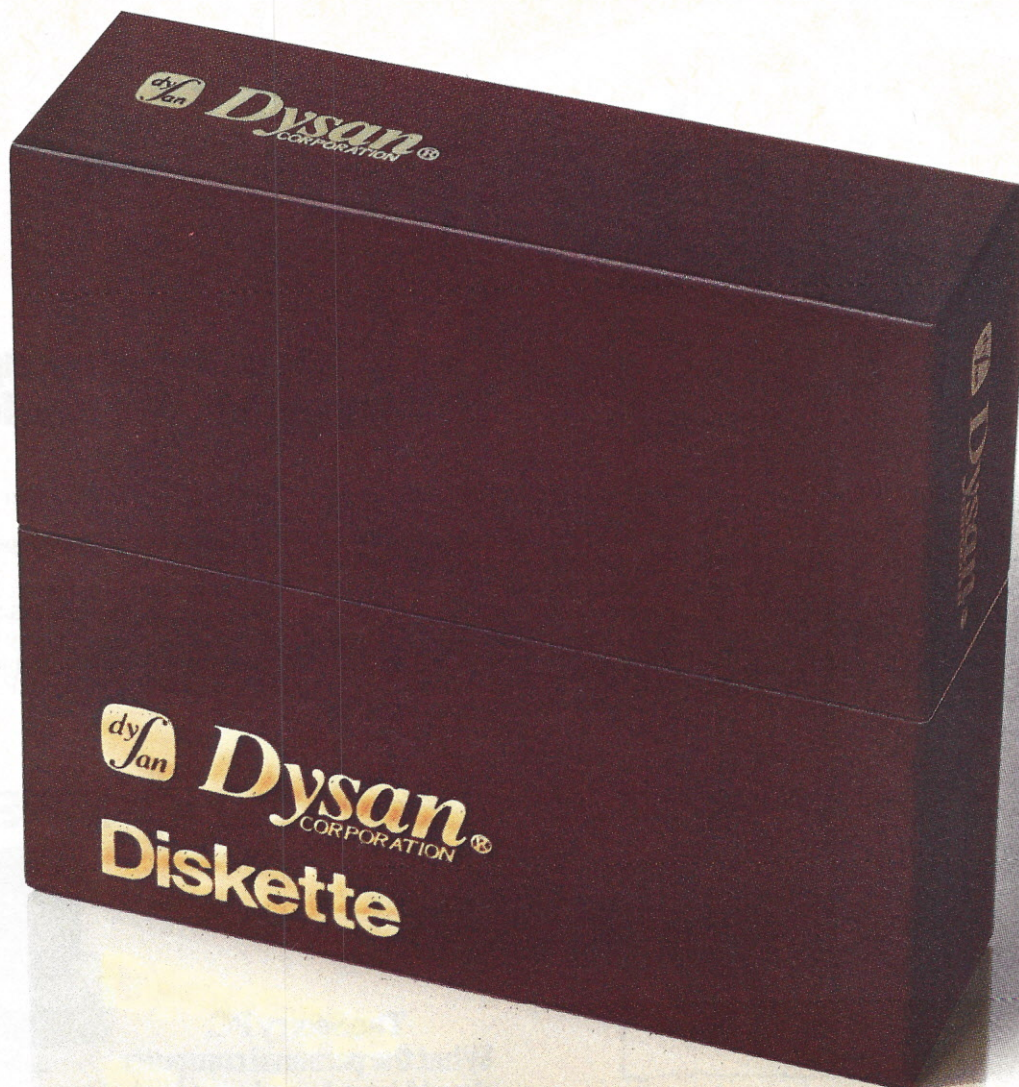
Dysan 5¼" and 8" flexible diskettes
are available at your computer products
dealer.

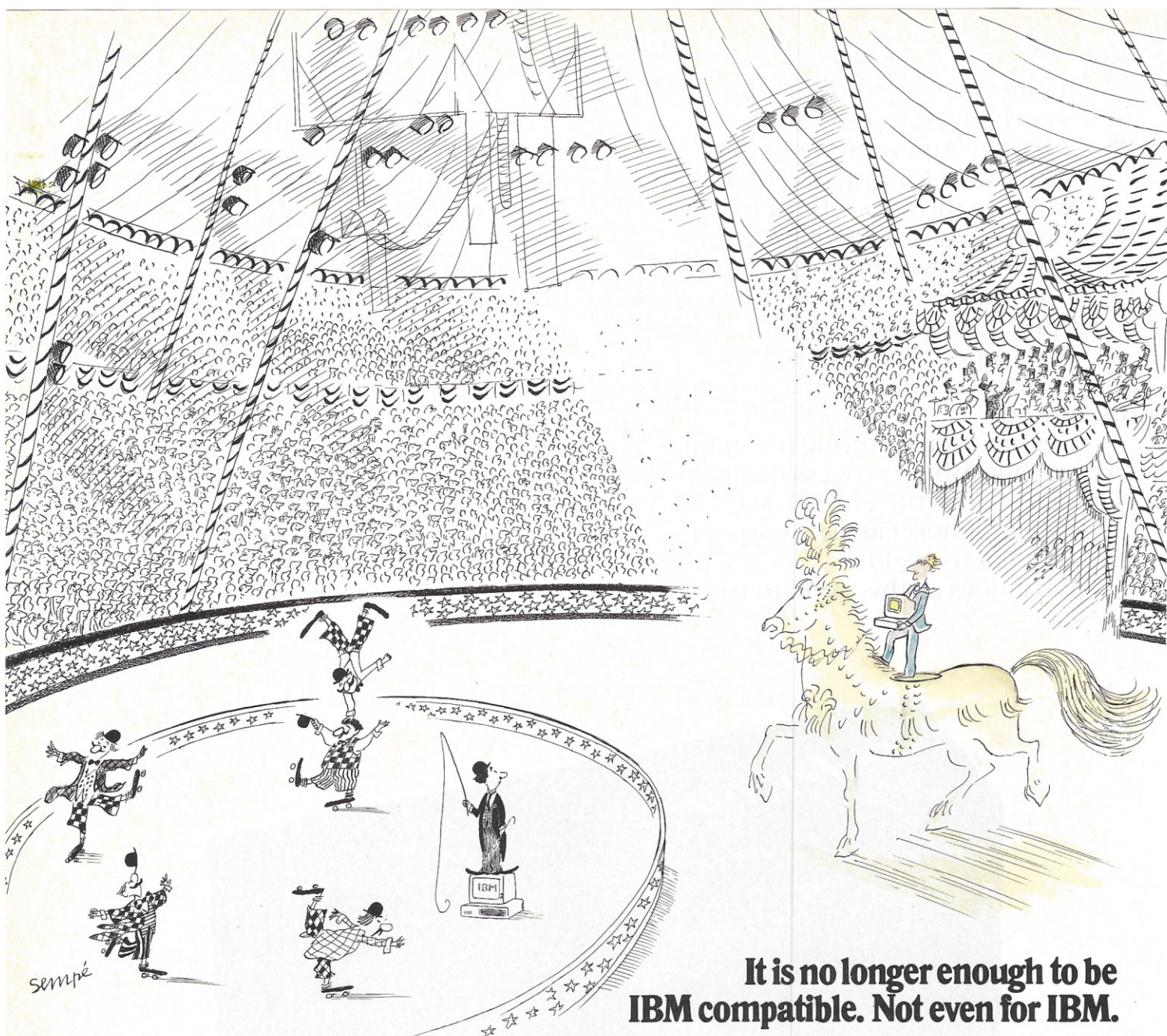
Call toll free for the name of the
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Dysan[®]

CIRCLE 50





It is no longer enough to be IBM compatible. Not even for IBM.

It was the personal computer circus. And it had gone on too long.

The crowd grew restless as each new act continued to perform varying degrees of IBM compatibility.

Suddenly, the crowd gasped. It was the unexpected finale—the arrival of Sperry, with a performance no one could have imagined possible.

Ladies and gentlemen, it was the Sperry PC. It ran IBM compatible software.

But that wasn't the show stopper.

Because it soon became quite clear the Sperry PC didn't just *run* the IBM programs, it ran them *better*.

| SPERRY PERSONAL COMPUTER SPECIFICATIONS | |
|---|---|
| OPERATING SYSTEM | KEYBOARD |
| MS DOS Version | 84 keys, 6 ft. cord |
| 1.25 or 2.0 with G.W. | AUXILIARY |
| BASIC MICRO-PROCESSOR | MEMORY |
| High-Speed 16-bit 8088 | Up to two internal 5¼" diskettes 10MB |
| DISPLAY SCREENS | internal fixed disk when configured with single diskette. |
| High Definition monochrome display | USER MEMORY |
| IBM compatible graphics. | Standard 128K bytes, expandable to 640K |
| COMMUNICATIONS | DIAGNOSTICS |
| Built-in Asynchronous | Power-on self test |
| | CLOCK |
| | Time-of-day with battery back-up |

Better because it ran them faster — up to 50% faster.

It ran them with breathtaking graphics, far more dramatic than the IBM PC could provide.

And it ran them from a keyboard that drew roars of approval, for it was not only easier to operate, but far more comfortable than IBM's.

And as the crowd cried out for more, that's just what Sperry gave them: the

ability to plug right into a company's main computer, whether that system was IBM or Sperry. Or both.

As the crowd sat stunned by this final flourish, Sperry left all with a most provocative question. Was it possible

that the Sperry PC could do all of this and yet cost less?

Again, the crowd gasped.

Could it be?

Come see for yourself. Hands-on, side-by-side. Call 800-535-3232, toll-free. Or write us. Sperry Corporation, Computer Systems, Department 100, P.O. Box 500, Blue Bell, PA 19424-0024.

SPERRY



The Sperry PC.
What the personal computer should have been in the first place.

CIRCLE 71

IBM Personal Computers. There was also a TallGrass 35Mbyte hard disk backup. It was on these machines and their assorted Zenith and Taxan monitors, Epson and NEC printers that the team began designing a program to help them keep tabs on all the delegates both before and during the convention.

While Corrado had had some experience with personal computers in the 1980 Carter-Mondale campaign, his strong suit was clearly politics, not programming. He could decide the type of information needed but it was volunteers who got the machinery up and running. Stephen Slade, assistant chairman of the department of computer science at Yale University, brought a small group down to Washington to meet with the campaign staffers.

"We talked through the practical applications we wanted to use," says Corrado. "We needed the ability to construct mailing lists and do mailings, both general and specialized. For instance, a mailing to all the delegates who were uncommitted or hadn't pledged. We needed to have alphabetical phone directories. We needed to be able to pull up people by issue, say, all women Mondale supporters interested in a jobs bill. And we knew that when we got to the convention, we were going to need a locator function to tell us where all the delegates were staying and where their delegations would be meeting.

"What we did in this initial design was to combine the political expertise with the computer expertise. For the most part, we wanted to design a program easily adaptable for to people with political skills. The software finally decided upon was dBASE II because it could give us all of what we needed and was the easiest to learn."

Unusual as it may seem, that last comment was echoed repeatedly by other staffers. Whether the data base manager, dBASE II, seemed simple when viewed against the complexities of the political campaign process or

whether, with little or no previous experience (or expectations), staffers just accepted the software on face value and plunged in, the fact is they found it easy to work with. Most likely, the situation of a group working closely and avidly to stay on top of the fast-changing complexities of a political campaign made adjusting to computers just one more hurdle.

Having defined the task and selected the means, the method was still waiting. With 3933 delegates, 1300 alternates and 25 fields of information on each, several of these subject to constant change, one critical concern was accidental loss of data. In fact, "one of the first things we did was to work out a backup system," says campaign worker David Moss, adding laconically, "we spend a good deal of time just being cautious."

Moss, who during the school year is a German history major at Cornell, is working at Mondale headquarters as an intern. He came in expecting to answer phones and do general office work. With only a high school course in computers as experience, the 19-year-old has turned himself into what staffers refer to as the in-house "guru."

Information on the delegates was compiled by 14 trackers and kept in thick, black, three-ring binders designated by state. Once the initial data was fed into the computers, printouts were added to the books. Whenever something new was learned, the trackers removed the computer sheets, effected the changes in red pencil and passed the sheets on to the staffers working the computer. The changes were recorded and then converted to IBM format where most of the manipulation of the information took place. New printouts were then returned to the trackers who were responsible for double-checking the changes before inserting the sheets back into the notebooks.

A typical sheet is headed by four lines of information: The name of the delegate—in one instance, L. Bennett—followed by FL-D-03-P, indicating

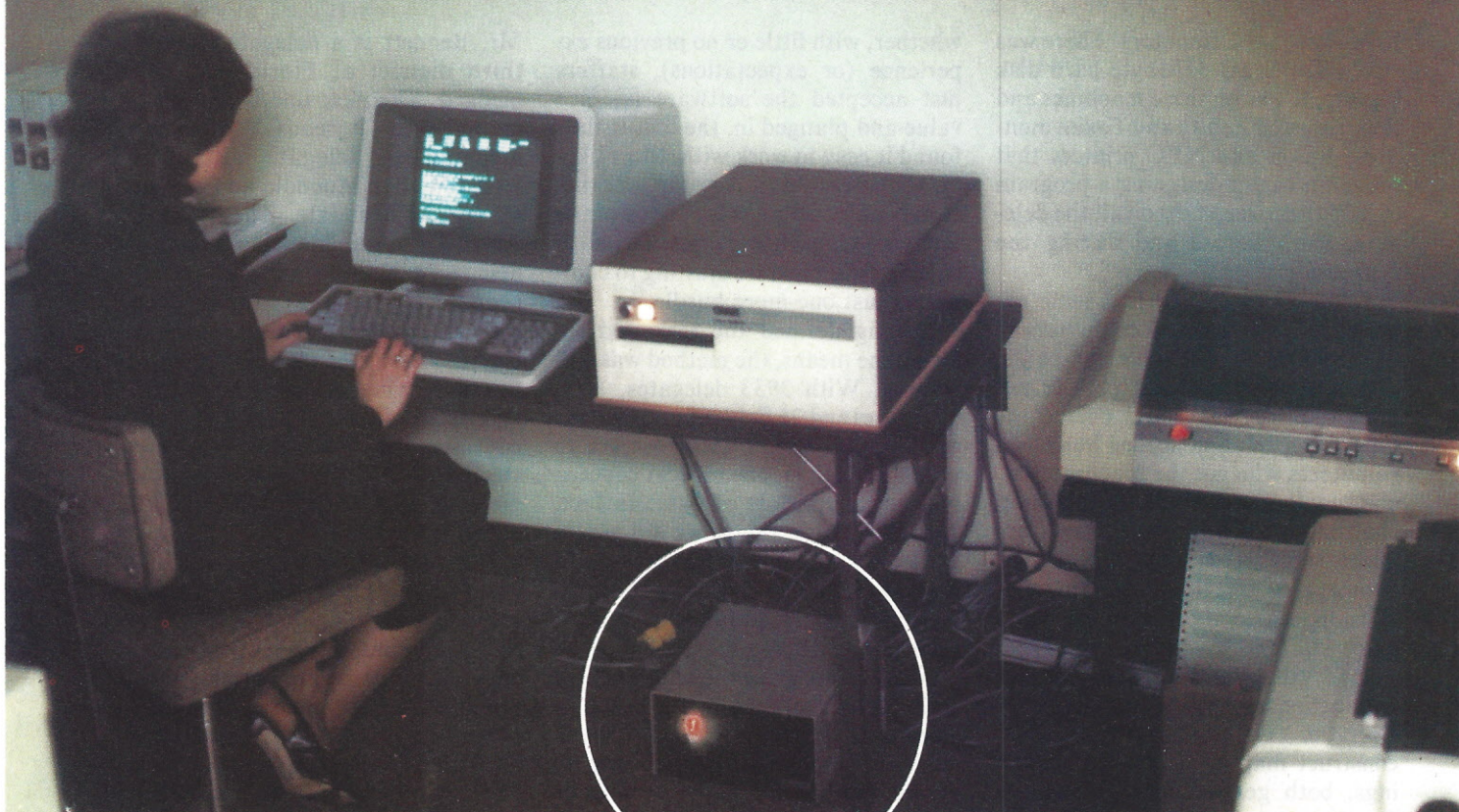
Mr. Bennett is a delegate from the third district of Florida and he's pledged. The next line is the fundamental one—it reads WM-1-WM, meaning the delegate initially selected Walter Mondale and remains strong on Mondale. The tracker's name, Tucker, follows, along with the delegate's mailing address and the proper salutation to employ when writing. Age, sex, demographics, occupation, issues of special interest, affiliations, whether or not he or she is an elected official and an ID number continue the list which may have started out with 25 fields but quickly grew to 31. (dBASE II's potential, notes Moss, is 32.)

Personal computers were used in a small way during the Carter-Mondale campaign in 1980. But in that campaign, computer use was limited to data collection and the production of mailing lists. Corrado's campaign experience coupled with the technological strides effected in recent years enabled the 1984 Mondale campaign to make much more extensive—and effective—use of computers.

But that's not where it stopped. Corrado himself estimates that using SuperCalc3 for budgeting saved him four hours a day during the first six months of the campaign. When you consider that \$10 to \$11 million was spent in those months with everyday management decisions sometimes demanding that adjustments be made over 14 cost centers at national headquarters, with any one cost center exhibiting 13 or 14 line items, it's no wonder Corrado looks exuberant when he says, "With SuperCalc3, I just plug in the numbers and hit the calculation button!"

And it isn't only in the areas of budgets and tracking that the personal computer has become valuable. There are eight other personal computers distributed around the 4700 square feet of headquarters. Murray Gallinson, the easy-going, bearded law professor in charge of campaign administration, says the Kaypros and

The U.P.S. and Downs of Business



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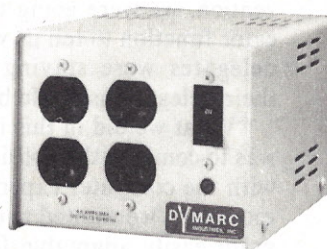
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CIRCLE 4

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IBM Personal Computers are used for fund-raising, scheduling, press releases, speech writing, legal matters and convention planning.

On leave from California Western Law School in San Diego, Gallinson brought his own Apple II Plus with him and uses it extensively for planning and personnel work. "As an example, I can pull out of the staff list everybody who's mobile, who has no kids and can travel for two weeks or who makes under \$12,000."

His major enthusiasm, however, is reserved for scheduling. Typically, a week's travel schedule for Mondale runs to dozens of pages and goes through six, eight or 10 drafts, each draft itemizing a minute-by-minute apportionment of the candidate's time, his appearances, speeches and contacts. Without the computer and WordStar, each of these drafts sucked up endless amounts of staff hours.

Last but hardly least, the candidate himself tours with a Kaypro. Frequently, a speech will be drafted at headquarters and the disk sent along to Mondale's traveling staff for revision or updating. A modem, too—the only one at the campaign headquarters—connects the issues (speech writing) department to the candidate on the road, says Gallinson, wincing slightly as he adds, "when it works."

Gallinson's vince was unusual as it embodied the only technological frustration acknowledged in the interviews, leading one to conclude that personal computers have just begun to find their place in political campaigns. It's not only that they can save time and money, Corrado later reflected. Computers, by providing information and computations no one would hitherto have attempted, are becoming essential. He notes that with a philosophical smile before heading back to the office, stepping easily over the sea of tiny circles on the carpet, a gratis snowfall from the hole-punchers that resembles parade confetti.

—Max Eliot

The Olympic Spirit Set To Music

Personal computers will be used extensively to help keep score at the Los Angeles Summer Olympic Games, but that will not be their only "scoring" application. The American Broadcasting Company (ABC) has made innovative use of an IBM XT to "score" the background music being used during the network's coverage of the competition.

The computer, located at ABC's broadcast center in Los Angeles, will provide a 1200-piece music inventory and scheduling system for producers seeking music for their segments. Indeed, dBASE II, along with an add-on program called DBKey, has turned the IBM XT into a computerized jukebox.

According to Roger Goodman, coordinating director for the 1984 Olympics at ABC, the idea first began to take shape about three years ago. "We decided that we wanted to have available to our production team whatever music they would need in the course of the games," he says. Goodman worked with Fred Karp, director of systems for New York's Score Productions, Inc., to put the scoring system into operation.

The computerized program was first used for the last Winter Olympics in Sarajevo, Yugoslavia, and 500 additional pieces of music have been entered since then. Prior to the 1984 Olympiad, the cataloging and selecting of the music was handled manually. "Before that, ABC never had an event that was so heavily covered that

they needed a computerized catalog," says Karp.

Here's how the system works. Suppose a producer needs a piece of music to go with a particular event. He or she can choose from the library of 1200 pieces of music, keyed by numbers which correspond to their locations on ABC's quarter-inch tapes. The musical selections have also been categorized by: general profile (i.e., determination, amusement, fast mo-



Photograph by Larry Williams

Roger Goodman, ABC's Olympics coordinating director, helped put the scoring system together.

tion, etc.); style (rock, pop or classical); length, to match the length of the segment to be aired (a piece can range anywhere from six seconds to eight minutes); instrumental mix (percussion, jazz band, electronic string); tempo (slow, medium slow or medium fast); and mood (triumphant, reflective, "agonizing" defeat, etc.).

A search program, written in dBASE II, inside the scoring system gives segment producers an entire library of music on immediate call by creating matches of variables. When descriptive words are entered, the computer searches the library and pulls selections which correspond to the descriptions. For example, a pro-

gram director who might want to score a segment on runner Mary Decker's performance at the Games would simply make a list of words which corresponded to what he wanted to get across in the piece and have these key words entered into the system's mood and profile categories. The producer might simply determine that he wanted something with, for example, a fast tempo and a driving mood. When key words are entered into the system, the computer will report on what meets those criteria.

The women cyclist's road race, for instance, could be accompanied by the Mendelssohn Symphony movement that also was heard in the movie "Breaking Away." But a hard-rock instrumental could be brought in for the drive to the finish line. Movie buffs with a good ear may recognize a variation of the "Raiders of the Lost Ark" theme as one of the pieces that will evoke the thrill of victory.

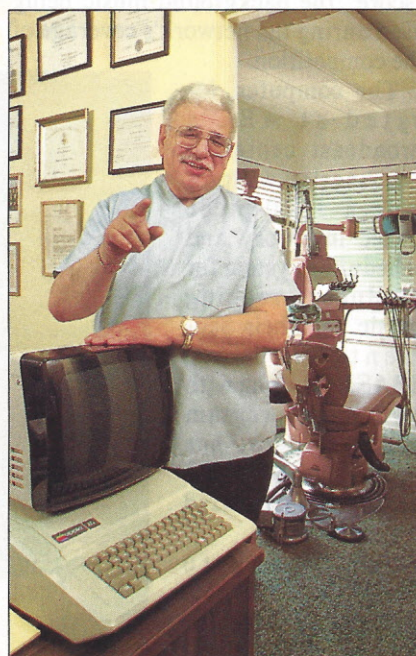
The personal computer's ability to keep track of the music as it is used also provides another benefit for ABC, because each and every time a piece is played, the copyright owner is due a royalty fee. Another benefit is cost control, adds Karp. "Having a central music source prevents everyone from running out and buying records."

This system, says Goodman, also provides a check against different producers using the same score back to back. Once a selection is made, the system keeps a schedule of when the piece is going to be used.

In addition, an add-on program to the dBASE II package called DBKey, a program from Metronomics in New Orleans, La., is enabling ABC producers to use the speaker on the XT. Karp went over the jukebox list, putting in codes for pitch and duration for up to the first 10 notes of some of the pieces. This way, if a producer is considering a piece of music that has been programmed to run through the speaker, the computer can even preview it for him.

Open Wide And Computerize

Less than six percent of all dental practices in the United States use a computer, and back in 1981, even fewer dentists owned one. That's when Dr. Leonard Axelrad of La-Grange, Ill., decided to become a pioneer in his profession—one of the



Dentist Dr. Leonard Axelrad uses an Apple II Plus in his office along with the Dental Billing System program.

first computerized dentists. "I don't know if I'll ever hire a receptionist again," he says today. "I save so much time, there's not much for her to do. It only takes me about an hour a day to get all the paperwork done for my patients." But getting to this point has taken Dr. Axelrad a long time and led him through many experiences he does not recall fondly.

Before finally assembling a system that suited him, he researched the market as thoroughly as he could. "I looked at hardware and software for a good six or eight months. I visited all the computer displays at dentists' conventions and got all the literature.

I read everything I could get my hands on in computer magazines. There just wasn't much of anything I could use."

Many dental offices treat as many as 3000 patients a year, but Dr. Axelrad is semi-retired and is not interested in expanding his practice. He enjoys giving careful and meticulous care to a group of just 300 patients, a number he believed could be easily handled by one of the new personal computers, instead of the then-available big-business models. "The smallest one would have cost at least 25 grand," he says. "On top of that, I'd have had to hire someone to write special software for it. I just didn't need all that power."

Only a few personal computers were available at the time—with the Apple II Plus and the TRS-80 series leading the pack. But Dr. Axelrad couldn't find specialized software for either of them. "I figured I might have to change a data base or billing program already on the market."

Because he found more of those moderately priced programs available for Apple, he decided on the Apple II Plus. But then he discovered a brand new program called Dental Billing System (DBS) from Andent, Inc. Specially written for the unadorned 48k Apple II Plus, it appeared to be exactly what he was looking for.

Even with all the research, Dr. Axelrad still spent almost \$20,000 for his system and software. He added a CP/M card to run WordStar, a letter-quality printer for statements and general correspondence, a dot-matrix printer just for preprinted insurance forms, a Corvus hard disk and two disk drives. (When the Apple IIe was introduced in 1983, Dr. Axelrad was first in line.)

With his system complete, Dr. Axelrad and his associate could now run his two-office practice more efficiently. Or so he thought. That was when his receptionist left for "greener pastures." "At least she got most of

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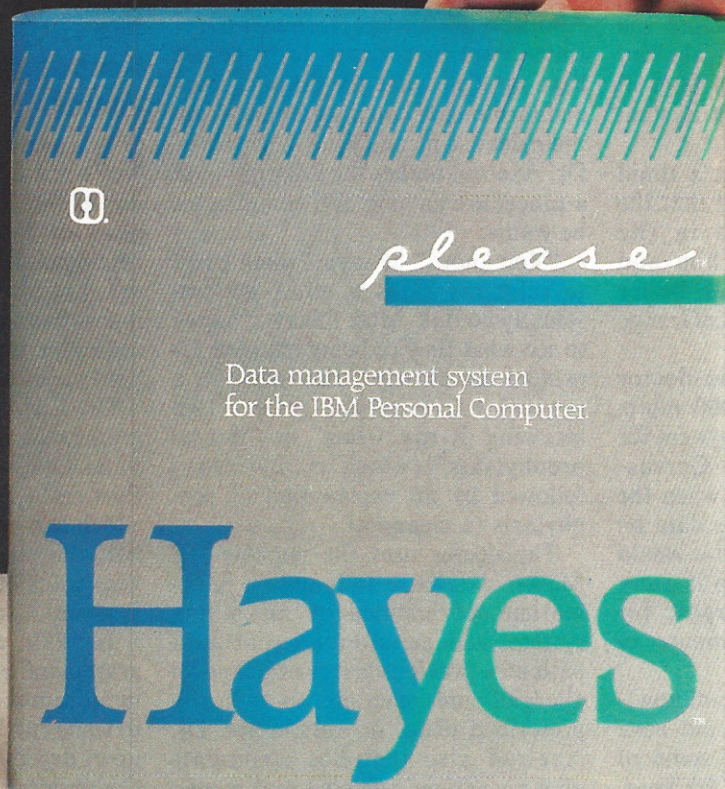
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CIRCLE 78

the patient data entered before she left," he says. Unfortunately, she had also uncovered a number of bugs in the fledgling Dental Billing System program.

Now, Dr. Axelrad is not a timid person. When he discovered that the program's author lived in the Chicago area, he called him and suggested that no one was better qualified to come out to LaGrange and take care of the bugs.

Then, unexpectedly, the doctor had to spend nearly \$10,000 more. Part of the additional money went for a backup system for the Corvus-stored records. It was only when the dentist started to resave his data on floppy disks that he realized it would monopolize his time. To do it every day would defeat the purpose for which he'd invested in a computer in the first place.

Frankly, Dr. Axelrad acknowledges that the amount should have been closer to \$5000 if, "some of those people in computer stores knew what they were selling." At the time, interfacing a hard disk with a personal computer using specialized software was stepping into uncharted waters. The doctor benefited from many experiments in trial and error—all at his expense. He cites as his best example the time a salesperson blithely sold him a "mirror" program for the Corvus, without knowing it was already included in the original software. "Return? Oh, I'm afraid we can't do that," the salesperson said later.

The heart of Dr. Axelrad's practice is the Dental Billing System. Thanks to his courteous persuasion, the programs are now clean of bugs. He starts by setting up a record for each new patient—usually while he or she watches. "Most folks really get a kick out of seeing themselves get computerized," he says.

One advantage of DBS is that Dr. Axelrad needs only to enter a "table of charges" once. Updating to raise or lower a fee takes only a few minutes.

Another advantage is one appreciated most by patients. Most people have no idea what the cryptic codes and terminology on a statement from their dentist mean. With his system, Dr. Axelrad makes the description of a procedure as long and complete as he wants.

"You know," he says, "when I had to raise my rates a bit, I got absolutely no flak. Most folks are happy to see what they're being charged for printed out clearly." For instance, a typical entry might read, "two bitewing X-ray films" or "dental prophylaxis" (which is routine)—followed by an explanation of prophylaxis (a cleaning).

The doctor uses the popular DB Master data base to maintain information not handled by his billing system, such as information about a patient's previous surgeries, known allergies and reactions to typically prescribed drugs or anesthetics. Dr. Axelrad also includes comments about a patient's visiting and paying tendencies—good or bad.

To produce letters or memos, Dr. Axelrad uses WordStar which he feels is generally too powerful for his needs—sort of an "atomic fly-swatter." Using a word processor this complicated to whip out an occasional inquiry or letter seems like overkill. But he's become quite fluent with WordStar and is not about to run out for one of the new, easier to use packages. He explains that he will get one, however, if he decides to hire a computer rookie to handle his correspondence.

If he had to do it all over again, would Dr. Axelrad follow the same path to computerizing his practice? "Probably," he says. "Except I might get one of those Apple-compatible computers with a keypad." In fact, he recommends that a dentist just beginning a practice should computerize with this low-cost approach. "Just make sure you don't buy the same thing twice."

—Ann Baldridge

Nursing With A Personal Computer Touch

Obstetrician/gynecologist Dr. Edward Lichten has brought many babies into the world these past five years at Sinai Hospital in Detroit, Michigan. Dr. Lichten, a father himself, has also helped give birth to an innovative system that uses personal computer technology to improve patient care in hospitals.

Dr. Lichten has written two programs that are now up and running at Sinai: One, which runs on an Apple II Plus, is a fetal monitoring system which can be used with women in labor; the other helps a nursing staff keep track of patient care on an IBM Personal Computer.

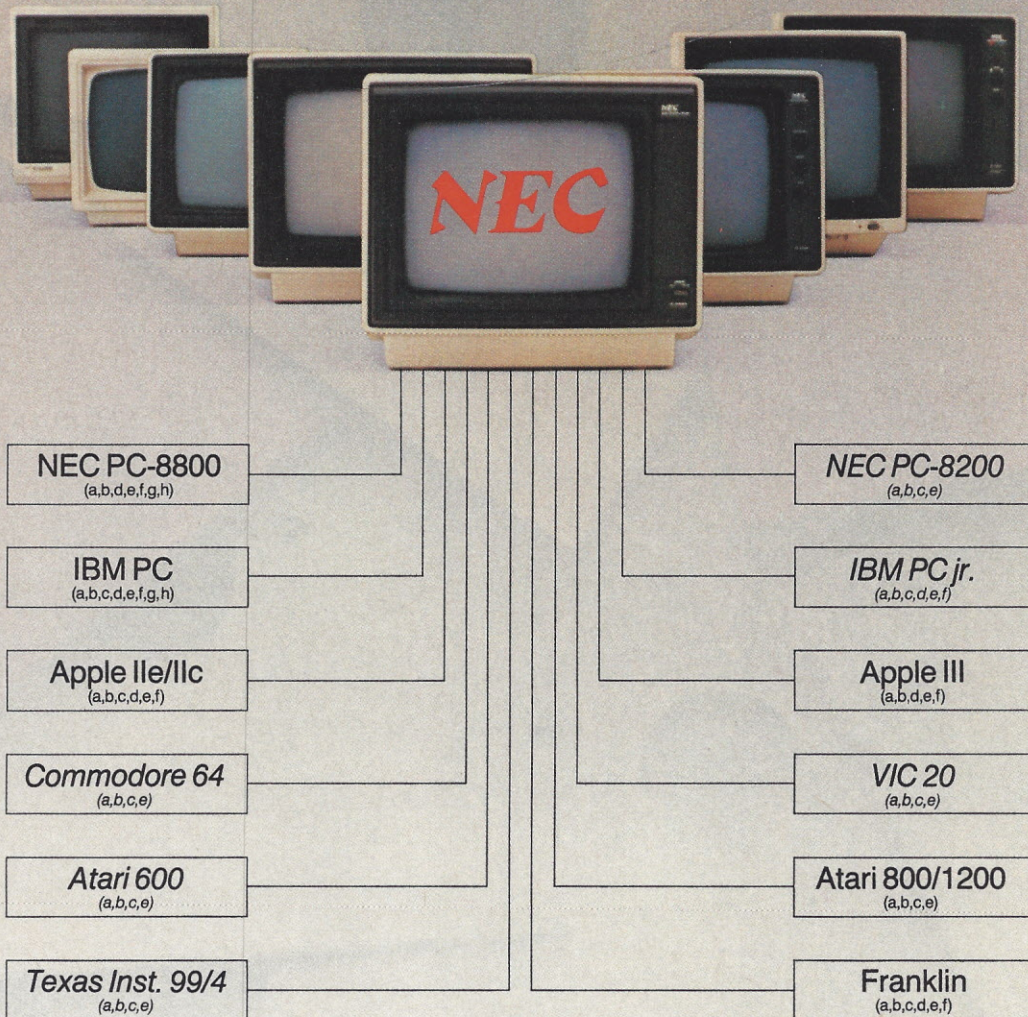
In 1979, equipped with some programming experience he gained on mainframes in medical school, added to some further experience he picked up by designing games on the family's Commodore PET, Lichten took on the task of developing a fetal monitoring system for the hospital. Much of Dr. Lichten's spare time was devoted to the project, which was completed and implemented in 1982.

"Hospitals are most conservative about new methods. Everything in a hospital takes time," says Dr. Lichten, adding that this fact is understandable since actual lives may hang in the balance. But he thinks personal computers can play an important role. "Personal computers can be right on the floor where needed and so can help to provide improved medical care."

Instead of designing his system to run on the hospital's mainframe, he decided to work with personal computers that could be located close to the patients and staff. "I want to work from the patient out, the technician out, the nurse out, the doctor out, rather than from any kind of computer out," he says.

Dr. Lichten's fetal monitoring program collects and interprets data sent

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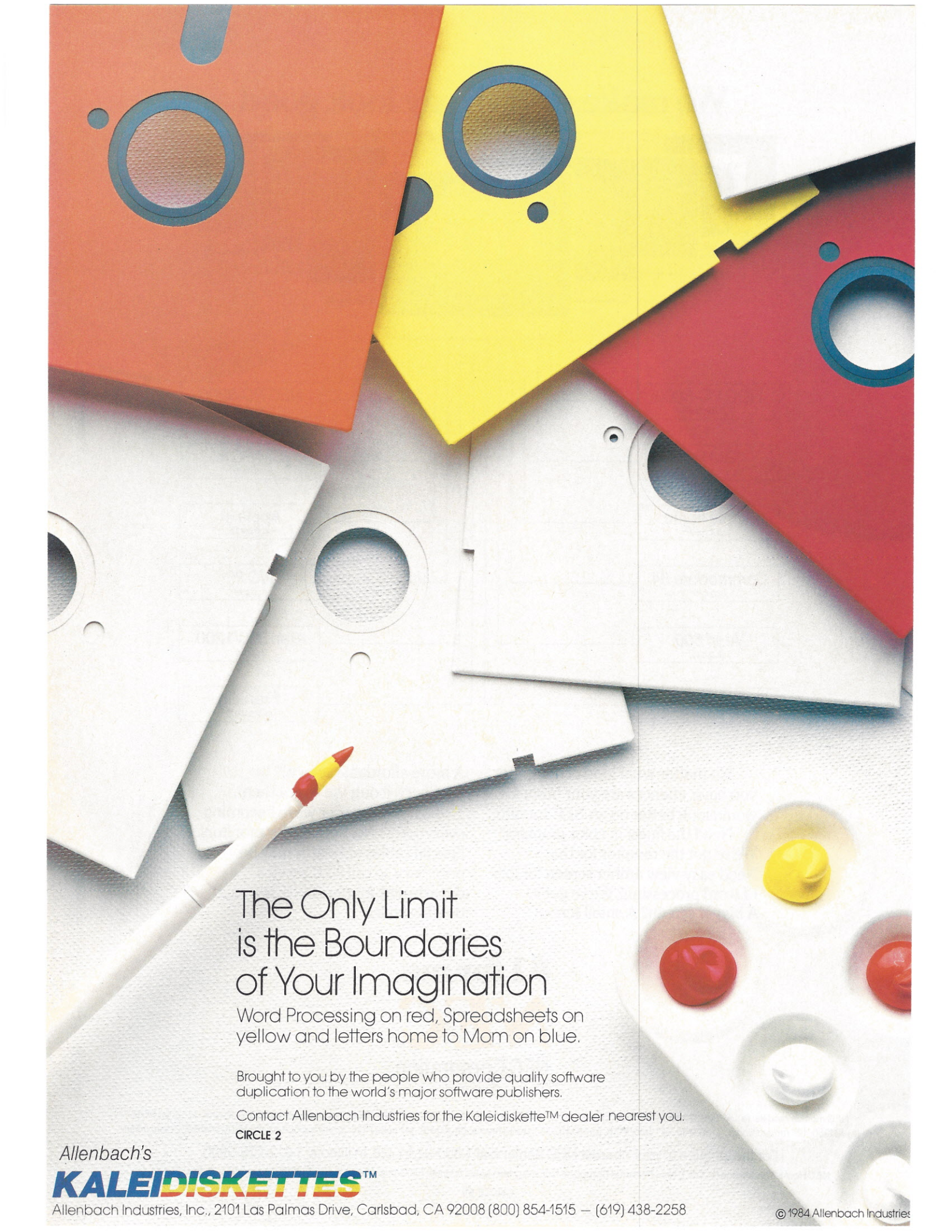
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to the Apple by cable from the electronic monitoring unit at a patient's bedside. "Ed's program lets me check on eight patients in a few minutes," says Sinai Perinatal Center head nurse Joe Theriault, "even watching out of the corner of my eye I can catch things."

Graphs of the fetal heart beat, as well as the mother's contractions, are

computer will beep. Additionally, the program can produce a printout of the last 17 minutes of monitoring. And, data can be transmitted via modem to a doctor working outside the hospital.

"The program provides an extra set of eyes, or feet really," Theriault says, "to check on patients. If I see a message flash on the screen, I can go in and adjust the position of the patient,

clerical function," now performed by the clerk during the shift.

In the program's Resident History section, nurses enter the patient's chief medical complaint "in the patient's own words," as the prompt instructs. Striking the "L" key will produce a list of symptoms and the nurse enters a "Y" beside each symptom that the patient is experiencing. Questions about patient care are also included in this section. Critical questions are highlighted and must be answered before a nurse can proceed to the next screen.

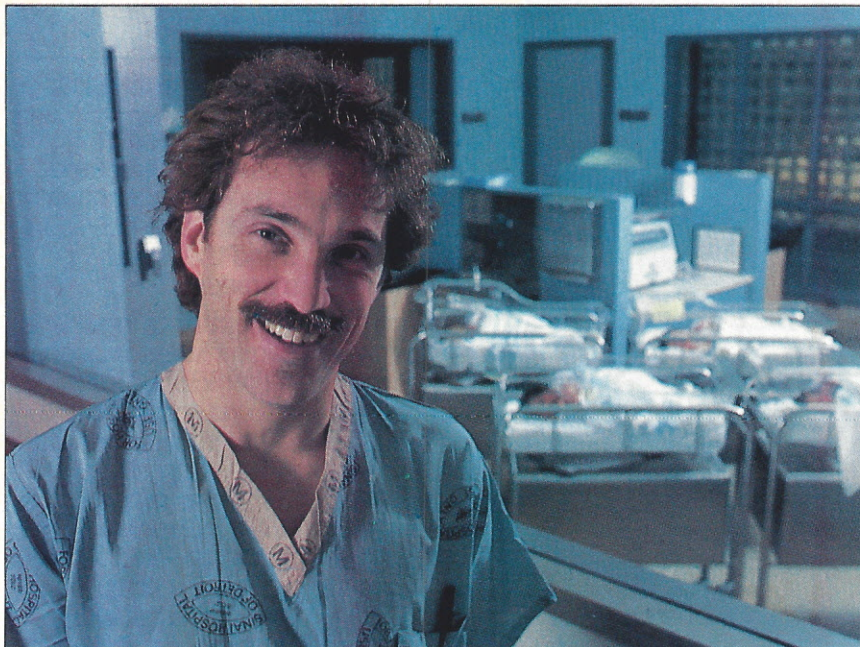
While both Anderson and Theriault are confident users, some of the nurses at the hospital were reluctant to use the programs. Predictably, Anderson reports, nurses who can't type are least comfortable using the computer.

To help ease the staff into computer use, Dr. Lichten has given tutorials to nurses, and informal user manuals are placed beside each computer. The program also includes built-in tutorial screens for novices.

"I didn't find the computer threatening," says Theriault, "but some of my staff did. Some people are intimidated by computers, but Ed worked closely with me from the beginning and I find it very easy to use." Both Theriault and Anderson report that some nurses are very enthusiastic and there is at least one confident user on every shift.

At Sinai, Dr. Lichten says proudly, "Every nursing station has asked for a computer for the next fiscal year." He says the hospital is allocating funds for more nursing stations and he has ambitious plans for expanding the use of personal computers at Sinai.

Not limiting himself to his own departments, Dr. Lichten is now at work on a program that will run on five IBM Personal Computers in the hospital's intensive care unit. There are also plans to move an IBM XT into an operating room to monitor patients during surgery.



Photograph by David Franklin

Dr. Edward Lichten developed two programs. One is a fetal monitoring system. The other helps nurses track patient care.

seen by the attending nurse at the central stations. Through software control a total of eight patients can be monitored by the Apple at one time.

Lichten says the program "diagnoses" situations in much the same manner as he would if he were on the scene. The program not only provides more information than a standard bedside device, it also interprets patterns in the data and will flash warnings to alert the attending staff. Warnings include symptoms of bradycardia (slowing of the fetal heart rate) and tachycardia (a rapid heart beat). If the program detects dangerous irregularities in a pattern, the

or call a doctor if necessary."

In the gynecology department, "the computer frees the nurses to do more nursing," says assistant head nurse Dalita Anderson. The program includes selections for Team Care Plans, Resident History, Census (patient information) and Nursing Notes.

The Team Care Plans, or TCPs, record nursing care provided during each shift for each patient. Anderson and her staff now find them an indispensable ingredient for high-quality nursing care. The plans have replaced handwritten grids passed on between shifts and have freed nurses from what Anderson sees as "basically a

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USERS
GUIDE

The Carry-On Computer

Air Force major Jim Sturgis, an instructor for the Tactical Air Command in Austin, Tex., is an avid personal computer user who faced an unusual problem until recently. Crew members on the RF-4C Phantom reconnaissance jets that he flies are per-


computers were incompatible with Sturgis' home-based Franklin Ace 1000. But now, a new product has come along to end Sturgis' off-duty woes: Apple Computer's IIc, a seven-pound portable which measures only 11 1/2" by 12" by 2 1/2" and is software compatible with the Franklin Ace. Because of its tiny dimensions, the Apple IIc is now a frequent flier. In

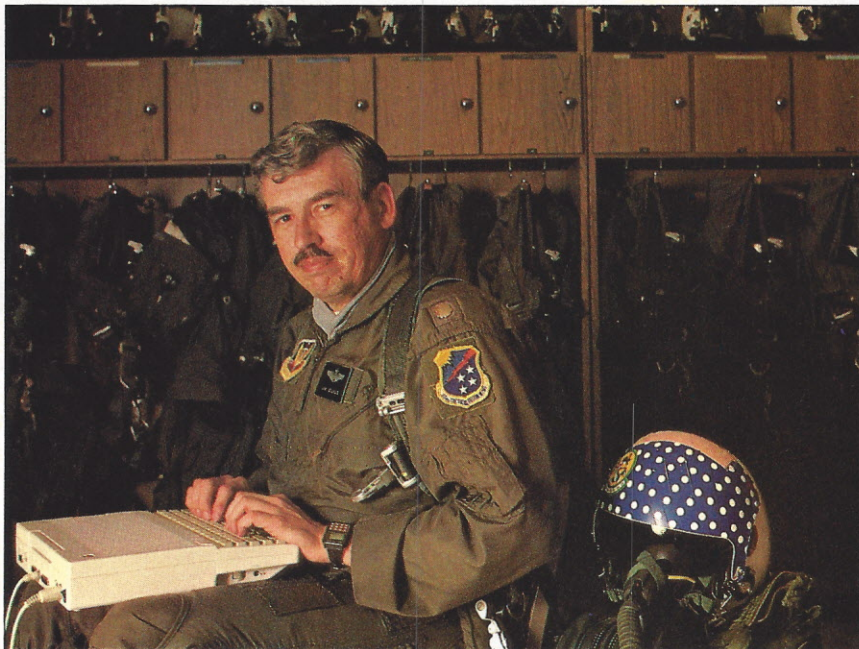
Air Force base by late afternoon. Before the next morning's departure, a period Sturgis calls "dead time," is when the 40-year-old pilot trades in his wings for floppy disks and a personal computer.

After unloading his gear, the IIc among it, Sturgis checks into his quarters and connects the computer with the television in his room. What does an Air Force pilot do with a personal computer when he's grounded for a few hours? Sturgis uses word processing programs for memo and letter writing, he tinkers with some graphics programming, some personal scheduling and—what else—flying the friendly skies with the aid of flight simulation software. "Strictly relaxation," he insists of his computer flights.

"By and large, flight simulation programs are very good," he says. "And in terms of flying, they do give you a very reasonable idea of what's really happening. That feeling of having control of your movement is a very, very powerful one. I'm surprised a personal computer can do as fine a job as it does."

In addition to his love of flying and computers, Sturgis is a military history buff who enjoys the adventure of war game software as well. "They're pretty realistic from a commander's viewpoint," he observes. On second thought, Sturgis describes his experience with games like Guadalcanal and North Atlantic 86 from Strategic Simulations as, "Well, they are not realistic really, but very thought-provoking."

Sturgis' military service includes three tours of duty in Vietnam for which he was awarded three Distinguished Flying Crosses. He sees a long and natural partnership for the military and personal computers. "We live in a high-tech age already," Sturgis notes, "and the military is getting to be a very high-tech business. We're flying high-performance aircraft and the personal computer fits right in." 



Photograph by Michael Salas

Air Force major Jim Sturgis takes a seven-pound Apple IIc with him during flight training missions at the Tactical Air Command in Austin, Texas.

mitted only a small area for their baggage. Thus, Sturgis was prevented from taking a system along in the aircraft so that he could pursue his passion between missions.

"I found that the nights I was staying in the officers' quarters on base I was really bored and missed my computer," recalls the 18-year veteran of Air Force duty. "I'd bring some computer magazines to read or maybe some (software) documentation to study. But I had no access to a computer. And I always thought, 'Boy, it would be great to have a portable computer to take with me.'"

Transportables proved to be too large to stow on board the jet and lap

fact, when Sturgis and his crew take off from Bergstrom Air Force Base in Austin on a training flight that will typically take them to another military base in, say, California, the computer, snuggled in its padded carrying pouch, and tucked in a baggage compartment inside the nose of the plane, is quite nearly standard issue equipment.

Sturgis explains that a routine training mission involves taking off in the Phantom jet—which is designed to go behind enemy lines and scout military positions during wartime—from the Austin base in the morning, performing various reconnaissance exercises and then landing at another

See what

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 - Travel arrangements?
 - Invitations, coffee and donuts
 - New jokes about spouses
 - Get budget approval
 - Workshop: where to buy apparel wholesale
 - Jokes about new television programs

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 - + Location
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 - Arrange air charter through travel agent
 - + Agenda
 - Day 1
 - Day 2
 - + Budget
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 - + Agenda
 - + Day 1
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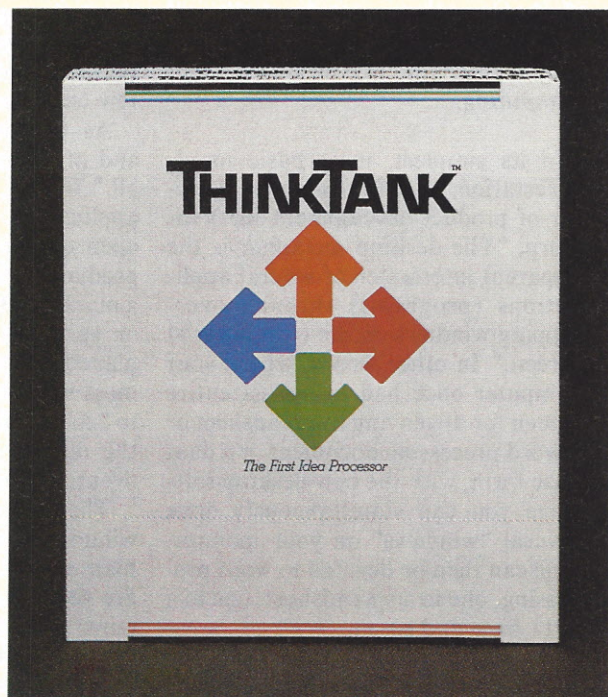
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The First Idea Processor.

The Desktop Environment

Why all the push for the "desktop metaphor" in personal computing? Where is it going and why should you care?

by Paul Bonner, Senior Editor

It is likely that by the time you read this issue, certain hardware and software companies will be flooding the marketplace with claims designed to leave no doubt that: A) Something called the "desktop metaphor" is absolutely essential to increased productivity; and B) that their proprietary implementation of this somewhat amorphous generic concept is exactly the one that's right for you. This article will tell you what the new desktop environment is really all about, where it came from and how it may change the way we think about computing.

In its simplest, most basic manifestation, says Bill Coleman, director of product development for VisiCorp, "The desktop metaphor is the apparent interaction of several applications (programs) through overlapping windows on the (computer's) screen." In other words, where your computer once had to use its entire screen for displaying a spreadsheet or a word processing document or a data base form, with the new desktop software you can simultaneously open several "windows" on your monitor. One can then be devoted to word processing, one to a spreadsheet, one to a data base and so on.

At that point, the logic goes, the screen "becomes," in effect, a typical desk top on which several documents or work folders might be arranged so

that they overlap one another. But the significant technical implication of all this is that each of the applications you display in a screen window is present in RAM or otherwise available at a moment's notice. Work proceeds through several distinctly different operations without the customary interruptions for reloading of programs or reformatting of data—just as work would have proceeded in the former paper desk top environment, through simply reaching out for whatever was to be done next. But there are some subtleties and even a few complications.

As Coleman notes, "Windows in and of themselves don't do much at all." In fact, if you're only using one application, having several windows open on the screen can be counterproductive, since each window shows a much smaller portion of a document or spreadsheet than could be displayed on the entire screen. Thus, most windowing software allows you to "zoom" in on one window and hide the others, giving the entire screen over to the application of your choice.

That being the case, what good are windows in the first place? As Coleman and others point out, windows are really doors that allow the computer to become more than a single-application machine.

Jeff Elpren, former president of Simtec (a sales organization that proved to be one of the most success-

ful dealers of Apple's Lisa, one of the first windowing computers), believes that windows are an essential step in the evolution of the personal computer. "There's a tremendous need to be able to work on an interrupt basis," says Elpren. "That's how humans work. They get started on one project, get interrupted and then have to spend five minutes on another project. This has been the shortfall of micros all along. All your wonderful things like your time scheduler and notebooks of all your numbers and names—all these things that look like great applications in fact don't work. Why? Because to use them for 30 seconds you've got to get out of what you're doing and boot them. In that respect windowing really makes a lot of sense. It makes some of those applications viable."

From whence it came

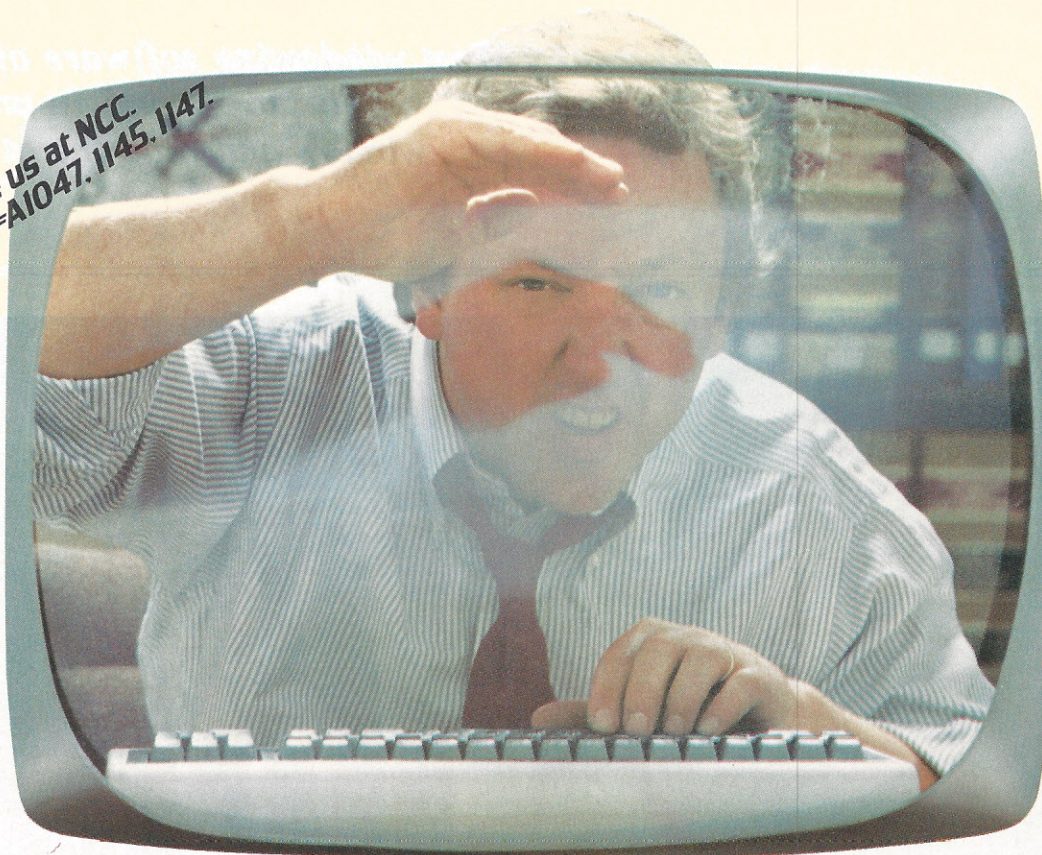
Although windowing systems are only now coming to the attention of the general public, the desktop metaphor made its first commercial appearance in 1981, in the form of the Xerox 8010 Star Information System. At a time when managers were just starting to accept the idea of using a simple spreadsheet on an 8-bit computer, the Star appeared to be nothing less than a blueprint for the future. It featured a high-resolution, bit-mapped screen on which files and programs were represented by icons (for instance, small

*Most windowing software allows
you to "zoom" in on one
window and hide the others.*



Concept by Robin Nelson; Art direction by Traci Churchilli; Set construction by James Nazz; Photographed by Vittorio Santor

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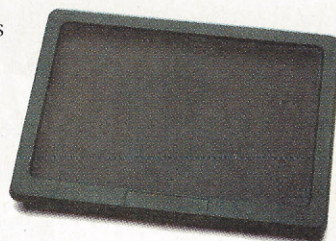
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pictures of file folders rather than a list of file names) and presented through windows. All commands were executed, all files and programs were selected by using a mouse to move the cursor, rather than through keystroke sequences. Multiple windows could be opened on the screen and data could be passed "through" the windows, between applications programs, with ease.

Designed to work either on a stand-alone basis or as part of an integrated office environment, the Star could be equipped with 512k of RAM, 10 Mbytes or more of hard disk storage and an Ethernet local area network with electronic mail facilities.

These capabilities were the result of a long development process which began, according to John F. Shoch, president of Xerox's office services division, in the early 1970s. "We made the commitment to a number of workstations, including, in particular, those that did the very sophisticated desktop metaphors—graphics, icons and so on," Shoch says. The purpose of these efforts, according to Shoch, was to design a computer that could be used not only by the hobbyist or technician, but by the untrained person who wanted to be able to work on a computer without ever having to think about how a computer works.

Among the building blocks for the Star were Xerox's experimental Alto computer, on which early versions of the desktop metaphor system with Xerox's Ethernet local area network were developed, and the developmental Smalltalk programming language. The latter was a medium in which, Shoch recalls, the engineers at Xerox's Palo Alto Research Center (PARC) "spent a lot of time on user interfaces and mixing graphics and text." In addition, an on-line system developed at Stanford Research Institute by a group headed by Doug Englebart, "used a mouse as a pointing device and had a very high quality text presentation," according to Schoch.

Xerox took a unique approach to

ward system design in putting those pieces together to produce the Star. As Jonathan Seybold noted in his 1981 review of the Star in *The Seybold Report* (Vol. 10, No. 16), "Most system design efforts start with hardware specifications, follow this with a set of functional specifications for the software, then try to figure out a logical user interface and command structure. The Star project started the other way around—the paramount concern was to define a conceptual model of how the user would relate to the system. Hardware and software

The public thought they were seeing something new when Apple introduced Lisa.

followed from this."

Despite its state of the art technology, the Star's market impact has been anything but overwhelming. Part of the reason for this is price. Although the Star has benefited from recent drops in the cost of technology, so that a stand-alone unit can now be purchased for \$8995 (which Shoch notes is "within shouting distance of a fully-equipped IBM XT"), the bulk of Xerox's installed base of Stars sold at a price point over \$15,000—which effectively put it out of the reach of most personal computer users. As a result, the popularization of the desktop metaphor did not occur overnight. In fact, most of the public thought they were seeing something entirely new in 1983 when Apple introduced Lisa, with its bit-mapped graphics display, screen icons, multiple windows and mouse controller.

Apple's Bill Atkinson, however, readily admits that he and his colleagues on the Lisa project were heav-

ily influenced by the work done at Xerox PARC. "Early in the game (circa 1979) we took a look at Alto," Atkinson recalls. "Alto was our first sight of the desktop metaphor. We saw it for about 90 minutes total, so we certainly didn't learn how to implement it there. But we got an idea that overlapping sheets of paper were a decent metaphor to express an environment where you really do manage many tasks."

The year of the metaphor

Like the Star, Lisa was widely acclaimed by computer industry representatives, but widely ignored by the computer-buying public. Again, price probably played a large role in the public's disinterest, since Lisa (with its bundled software), was released at a price of \$9995.

Thus, it remains for 1984 to go down in history either as the year in which the desktop metaphor truly becomes a concept for mass installation—or else the personal computing industry's folly of all time. Already this year we've seen the release of the Macintosh and the new, more powerful and lower-priced Lisa2 from Apple. The desktop environment's software parade has been joined by VisiOn, Quarterdeck DesQ, Microsoft Windows, Symphony (Lotus Development Corp.), Framework (Ashton-Tate), Enable (The Software Group), Concurrent PC-DOS (Digital Research), Core Executive (Application Executive Corp.) and a host of other packages. These products are designed to make windowing software affordable and to move it to the most popular personal computers.

Robert Carr, chairman of Forefront Corp. (which developed Framework for Ashton-Tate) says, "Like the spreadsheet, the desktop metaphor is almost a standard. It's a standard because it works. If you look at just the desktop aspects, I think you'll find that all the systems are very similar. VisiOn, Lisa, Framework and the Star are all much more similar than

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“The user shouldn’t have to think about how to use the system, but only about solving problems.”

PRODUCTIVITY

they are different when it comes to the desktop metaphor.”

Why has this type of software suddenly become so popular and seemingly so important? “There are two main driving forces behind the desktop metaphor,” Carr says. “One is the need and urge to somehow expand that limited screen area to give the user more functionality and viewing capability. The other is the need to present a better system for putting information in order.”

Apple’s Atkinson, who played a major role in designing the user interfaces for both Lisa and Macintosh, adds that, “Windowing is not just expanding the screen width. It really is more a function of retaining context. If you’re in the middle of a document and you have to get out a calculator to do some calculations and then put back the calculator, without windowing you’re talking one screen going away and the new screen with the calculator coming up. You have no reminder of where you were. But when you see a little piece of the document window sticking out there under the calculator it gives you a feeling of continuity and a reminder of context. You have a feeling that the document is still there ready for you, waiting to be worked on.”

Ideally, VisiCorp’s Coleman believes, the end result of all this should be that, “Once a user has learned how one application operates it should be obvious how he works with other applications. And moving data or viewing his data differently through different applications should be a natural extension without going through a lot of reloading programs and saving files and all that. What we’re really saying is the user shouldn’t have to think about how to use the system in order to use it, he should only have to think about how to solve the problem.”

It remains to be seen whether the software buying public will embrace these products, since they are only now becoming widely available. The answer would seem to rest on a num-

ber of factors, including how strong the “need to work on an interrupt basis” really is, and how well these packages perform in meeting that need.

How fast is friendly?

One question that arises in many people’s minds is, doesn’t all this attention to ease of use slow down the experienced user. In fact, doesn’t ease of use imply mediocre performance?

Bob Hamilton, vice president of software development for The Software Group, argues that it doesn’t, saying that performance should be measured “not so much by what the computer can do but by what the person at the keyboard can do. You’re measuring performance as applied to the human in terms of their work environment, not necessarily how fast bits and bytes can move behind the screen. The target is to improve the human performance. It’s a different perspective, because early in the game it was just trying to get an order entry system or payroll to work within a certain period of time. When you say performance to people who have been around computing for a long time, they immediately think of what the performance is relative to the hardware as opposed to the tools that are provided to the user.”

In addition, most developers of desktop software seem to recognize that the speed with which a system responds is one of the measures of ease of use. As Apple’s Atkinson says, “When you come down to it, what’s the most user-unfriendly thing you can do? It’s to be slow.” Hal Stegar, Digital Research’s product manager for Concurrent PC-DOS, adds, “One of the worst things you can do to people is to make them wait.”

All these developers claim that performance speed was at or near the top of their specification list in designing these systems. Nevertheless, there is legitimate doubt in many cases as to how well they’ve met the performance specifications. Apple’s Macintosh, for

instance, has been criticized for frequently making the user wait an inordinate period of time while it performs various disk functions behind the scenes. Forefront’s Greg Stikeleather, describing the effect of delays like this, says, “Picture turning the knob on your stereo and having to wait 10 seconds for the volume to go up. If you start turning several knobs before you wait for the reaction, the amount of time it takes to learn what happens and the annoyance in waiting becomes very high.” On a computer, he adds, “Those sort of pauses are short enough so that you can’t do anything else useful, but long enough to break up your train of thought.”

The bottom line is that no matter how friendly a system is, it has to perform well. Elpren asserts that even with a system billed as being the ultimate in ease of use, such as Lisa, performance ended up being the bottom line. “The heavy users were the people buying Lisas, not the newcomers or light users,” Elpren says. “It was an applications sale. The people who were buying it were usually looking for some very powerful facilities that they could only get with that environment. Specifically, the two that really stuck out were LisaDraw, with its exceptional graphics, and LisaProject. To sell it, we went after corporate departments that had project management going on.”

At the same time, Elpren notes, the original version of Lisa was undermined by the weakness of some of its other applications. “LisaCalc wasn’t competitive with Lotus 1-2-3,” he says. “Even just the process of moving the data from the spreadsheet to the ‘clipboard’ and back into LisaGraph was a little cumbersome, especially if you had to do it over and over.”

Lotus 1-2-3’s advantages were not coincidental. Lotus president Mitch Kapor recalls that in designing 1-2-3, and later Symphony, “We had the notion of a single unitary data structure. That is, to do a graph you just hit the graph key. If you change a number

and then hit the graph again there's the new graph instantly. The advantage of that approach is that you don't get into the kind of cutting and pasting operation that you would otherwise have to do."

The differences

Beyond the presence of windows, the differences between various desktop software packages multiply rapidly. All of these packages are designed in one way or another to make it easier for the user to work with multiple applications and to move data between applications. But developers have taken a number of different ap-

proaches in the process of implementing these design goals.

Among the key questions raised by these different approaches are: Are windows enough or are the icons and mouse control—which many of the new systems ignore—necessary elements of the true desktop environment? Can these systems be used effectively to integrate off-the-shelf software, or are customized applications packages necessary? Is true concurrent operation of various applications necessary or merely the appearance of concurrency?

On the Star and Lisa, and later the Macintosh, windowing was tied to an

icon and mouse-based command structure. There are no Control or Alt keys to be found on these machines—to select a command you use the mouse to move the cursor to an icon or a pull-down menu. But as desktop environment software migrates to the IBM Personal Computer, very few of the new software packages use the mouse and fewer still use icons. There seems to be some doubt as to the usefulness of the mouse in day-to-day activities such as word processing, and there is a general feeling that icons are not viable with the limited graphics resolution of the IBM.

Kapor says that "the appropriate

DESKTOP VS. IBM AND CLONES

With the release of software packages such as Symphony (Lotus Development Corp.), Framework (Ashton-Tate), VisiOn (VisiCorp), Quarterdeck DesQ and many others, the desktop metaphor has come to the IBM Personal Computer and IBM-compatibles. Or has it? One of the hottest debates in the industry now is just how "transportable" the desktop environment really is.

The answer would seem to depend a great deal on how you define the desktop. Windowing, as demonstrated by the products named above, is certainly possible on a 16-bit MS-DOS based computer such as the IBM Personal Computer. But other elements of the desktop metaphor as seen on the Xerox Star and Apple Lisa—including the use of a mouse controller to select pull-down menus and screen icons representing files and programs—are absent in the major windowing packages appearing for the IBM, due to what the developers of those packages perceive as limitations in the IBM's system.

"The generic desktop environment will evolve into all sorts of actual products," argues Mitch Kapor, president of Lotus Development. "As for the mouse and icons, I really think that is a function of the best fit to technology. We were not convinced that on the IBM Personal Computer and its brethren

there was sufficient resolution or quality of display devices or, in fact, necessarily enough memory to fully embed icon and mouse support. The Lotus Macintosh product (which will not be available until a 512k version of the Macintosh is released at the end of 1984) fully supports the mouse and icons. So why we or anybody else might or might not choose to use certain parts of the desktop environment as originally seen on the Star is really a function of what's going to work on a given piece of hardware.

"I think there are software absolutists . . . people who believe in windows and mice apparently for their own sake," he adds. "Philosophically, they say, 'We've seen this and we're going this way. This is what we build our products around.' We, I think, have a more flexible, less purely ideological approach to building products. It's not so much a question of adapting the Lisa/Star metaphor but of using that as one of a number of important building blocks in creating a product."

Forefront Corp.'s Robert Carr seems to agree with Kapor, saying, "As a designer I would love to be told, 'You've got a very high-resolution screen, you've got a Motorola 68000 microprocessor or even more powerful chip, you've got 512k of memory, go do it.' I think the graphic representation above all else is

what you can do better with that kind of hardware. To be frank, I think that would be a better system than one that limits itself to working on a character (rather than graphics-based) screen. Unfortunately, the price-functionality curve on the hardware is not yet at a point where you're going to be able to deliver the benefits of the desktop metaphor to that many people that way compared to aiming for a lower hardware base requirement. We've tried to draw the line where we can bring as much of the desktop technology as possible to as many people as possible, by shooting for a hardware base that is very minimal."

Chris Morgan, vice president of communications for Lotus Development, agrees. "The metaphor has to make sense with the given hardware," he says, adding that features such as screen icons are more suited to machines such as the Macintosh with its higher graphics resolution. "When you're working within the confines of the average color monitor there are trade-offs. There are only so many pixels on that screen that you can use to create an image. So what you want is simplicity on such a display."

One of those trade-offs—the lack of screen icons—is a major one, according to Jeff Elpren (former president of Simtec, a large computer sales organization). "The retrofit of windows on the IBM doesn't really address its

Programs, such as Symphony and Framework, combine windowing functions and applications.

use of icons and the standard user interface such as on the Macintosh really does simplify things to the extent that you can present the same functionality that you otherwise would and make it more accessible and easier to use." Nevertheless, while Lotus's product for the Macintosh will support icons and the mouse, neither 1-2-3 nor Symphony does so on the IBM, a decision Kapor says was based on finding "the best fit for the technology." Chris Morgan, Lotus's vice-president of communications, adds, "The metaphor has to make sense with the given hardware. We found that most people who own

IBMs don't own a mouse and we didn't want to get into the hardware business."

The question is, how well does the desktop metaphor work without an icon-based command structure. Elpren argues that icon-mouse technology is very important. "It is intuitively right. Apple's execution of it may or may not be the right one, but it does get us to a higher level of communication," he says. "The history of computer science for the last 25 years has been nothing except that very concept of, step-by-step, getting to a higher level of communication . . . from Assembly language to higher program-

ming languages to higher level languages like the data base languages. I see the icons on the desktop environment as just part of that process. They let you communicate with the machine very fast by just ordering them. It doesn't matter whether you do it with a mouse or touchscreen—whatever."

Others argue that in many cases the user might be better off without either the mouse or the icons. Charles Mauro, president of a New York-based human factors engineering and design firm, says, "When you combine the mouse and the icons you have a new language, a language in which there

symbolizing—the use of icons as a high-level symbolic language," Elpren says. "You're still communicating at a much lower level. If you put them side by side and give yourself a task of copying all the files on one disk to another, you'll quickly see how much more rapidly you communicate using the icons. So it addresses one need and is superior to a non-windowing environment, but it doesn't go all the way."

Apple's Bill Atkinson questions whether software developers should go that way at all. "You have to have enough horsepower to back this up or it's not the right thing to do," he says. "They've all seen the windowing on Lisa and Mac and the Star and said, 'Let's see, this looks like the wave of the future, let's do it' and sort of all jumped on the bandwagon without counting the cost and making sure they've got enough processing power to do it. The Motorola 68000 (the microprocessor in the Lisa and Macintosh) is just barely keeping up. The poor little IBM doesn't have a chance."

"I think that people are interested in it and doing it is a validation of the concept," Atkinson adds. "But the problem is they don't have enough horsepower to do a good implementation of it."

Robert Carr, who worked in Xerox's Advanced Systems Department on a planned successor to the Star prior to forming Forefront Corp. and developing Framework for Ashton-Tate, offers a

different opinion. "I think when you're examining the validity you have to look at the real needs of real users in the marketplace," he says. "I doubt that very many people would disagree that hi-res screens and having a tremendous amount of computing power enhance the desktop metaphor and allow you to do more things. The Star and Lisa systems have been exploring that direction. But I think you have to look at the realities of the marketplace out there and ask the question: 'Is this pie-in-the-sky technology that can only be used by the few tens of thousands of people out there that can afford these machines or is it something that you can bring to the hundreds of thousands of people out there who are buying IBMs?'"

When we repeated Carr's appraisal of "the realities of the marketplace" to John Shoch, president of the office systems division of Xerox, his reaction was: "That's clearly a fallacy. If that were the case IBM would have brought out a CP/M machine with an 8-bit processor or a clone of the Apple. My view of that is that there comes a time when you cannot ask a Volkswagen to pull a horse trailer."

In Shoch's view, the desktop metaphor as presented on the Star remains "the goal towards which many other developers are striving. They have been able to pick up only pieces of Star or a thin veneer of its capabilities. What they've tried to do is squeeze as much of

the Star's capabilities as they can into a smaller machine. We looked at that option ourselves and we chose not to do it. We thought it would be an unsatisfactory presentation." He adds that he welcomes Xerox's new competition in the area of desktop environment software and hardware, feeling that "people will get a taste of it in systems like VisiOn, Framework and Symphony," but that as their "expectations continue to spiral upward, people will come to appreciate the depth and capability of Star."

In the end, talk alone won't decide whether the IBM Personal Computer can offer the desktop environment or even a facsimile of what is presented on the Lisa and Star. That answer will only come as users begin to explore these new products and see for themselves whether the promised benefits are really all that their vested interests represent them to be. Tacked onto a recent across-the-board price cut announcement was IBM's acknowledgement that larger minimum memory requirements of "new, powerful programs that offer windowing functions" was behind recent product design changes in its personal computer line. What seemed to be almost an aside, in this case, might have been the first hint that IBM has another new, soon-to-be-revealed, definition of desktop environment.

And when IBM takes time to define something, they rarely have a limited market in mind.

are no verbs. A good analogy is an Indian language, Hopi, which has no verbs. If you want to go down to the water you have to say 'down water' and imply the direction with a hand motion. The same thing happens with a mouse. If you want to open a file you position your hand on the mouse and you move it and the arrow moves to the file. You click on that and that's the action. So all the verbs take place by hand action. That's very appropriate for gross positioning or very simple tasks, but as soon as you get into anything that's more complex than that you've simply got to revert back to a menu-driven interface.

"I think the underlying concept (of the mouse-icon interface) is correct," Mauro adds. "The thing I found objectionable is that it's positioned as a panacea. Manufacturers equate ease of use with a mouse. The mouse is only appropriate for a very small number of specific tasks. It's excellent for manipulating predrawn or rectilinear objects on an established grid, but it's basically useless for freehand drawing. Cursor keys are easier to use in word processing."

VisiCorp apparently made similar observations in developing VisiOn. "We designed it from the start with the mouse," Coleman recalls. "Early on we were very religious about it. We lightened that up a fair amount before we shipped. We're still moving more and more in that direction to allow things to be done without a mouse." Other companies have made the same compromise. With Quarterdeck DesQ, for instance, you either issue commands through the time-honored control-key method or use a mouse to activate pull-down menus and select commands from them.

One of the most distinguishing characteristics among the various desktop environment packages now appearing is their degree of open endedness. Some packages, such as Symphony and Framework, combine windowing functions and applications in one large program. Others, such as Visi-

On (and the Macintosh, Lisa and Star computers), provide an operating environment that requires customization of software intended to run within it. Still others, such as Quarterdeck DesQ, Concurrent PC-DOS and Core Executive, claim to bring the features of a windowing environment to any MS-DOS program.

Each of these approaches has its own advantages and disadvantages. The all-in-one packages, such as Symphony and Framework, are fast because all their applications are combined in one program. Equally

"By combining the mouse and icons, you have a new language in which there are no verbs."

important, they can provide a higher level of data integration than other programs. For instance, a graph can be defined as dependent upon the range of a spreadsheet, rather than upon the virtual numbers that reside in that range at the time you define the graph. Thus, if the numbers change, the graph is automatically updated.

The problem with the all-in-one approach is that the applications they provide may not provide all the depth of the best stand-alone applications and you are usually limited to the applications the developers choose to provide, chiefly such common applications as word processing, graphics, spreadsheeting, data base management and communications. (In some cases, however, the developers of all-in-one packages have made provisions for the incorporation of additional functions within the original package. One example of this is Lotus Development's Symphony, which is designed to incorporate specially devel-

oped "add-on applications.")

Products such as VisiOn, Lisa, Macintosh and Star provide what is called an "operating environment" within which specific application programs can be used. The advantage of this sort of environment, as Coleman explains, is that, "You can extend them simply by installing new programs. They provide several levels of data integration and if there are some standards in the system they can provide integration of the user interface, so that performing a specific function in one program is always the same as doing it in any program."

A consistent command structure is an important factor in the usability of any system. Without it, you have what Mauro calls "a negative transfer." Negative transfer is the worst kind of human factors engineering problem you can have, Mauro says, "because if you have a command that does one thing in one program and behaves slightly differently in another program, the user in effect has to unlearn and relearn that everytime he goes through that process."

The disadvantage of operating environments is that they, like the all-in-one integrated packages, suffer from limited expandability. As Paul Hunt, president of Application Executive Corp., notes, "An environment like VisiOn requires new programs to be written in order to run on it and it requires a sizable investment on the part of the developer for the tools to write those new programs. What has been written has generally been in the tone of generic packages, like a spreadsheet package, a graphics package, a text processing package. But the personal computer is used much more widely than that. People need accounting systems, inventory control, order entry, all those things, or they have specific vertical market packages that they need."

This problem is compounded by the growing proliferation of these environments. If a clear leader or an accepted standard emerges in this



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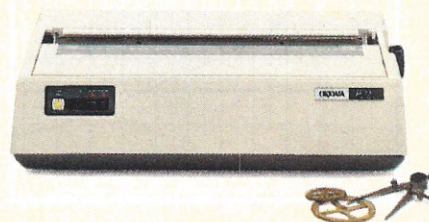
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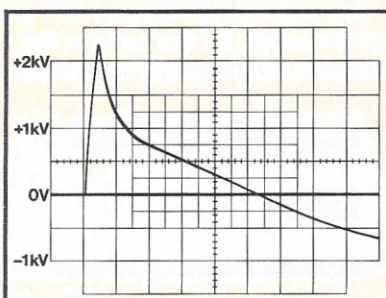
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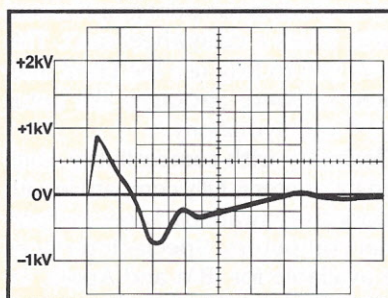
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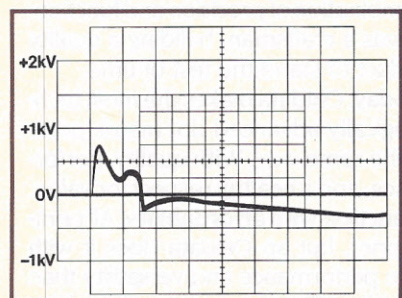
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CIRCLE 56

field—on the order of the emergence of MS-DOS as an operating system—then it would be reasonable to expect that a large number of software developers would invest the time and funds necessary to develop widespread applications to run under the winner's environment. But as long as a slugfest goes on between VisiOn and Macintosh, and Microsoft Windows and others, the end-user of these systems may be limited to generic applications.

Thus, with Core Executive, Hunt's firm has taken an approach similar to that used in Quarterdeck DesQ and Digital Research's Concurrent PC-DOS, by allowing the user to load multiple off-the-shelf MS-DOS programs into memory and by providing windowing and data transfer functions for use with those programs. "The availability of good software in a market like the one for the IBM Personal Computer is just fantastic," Hunt says. "So the idea is to take those concepts—to be able to use programs like you would in a desktop environment—and extend it to the existing market of software."

The shortcoming of the general integrator approach is that the level of integration they provide is rather minimal. They give you the ability to create multiple screen windows and to transfer ASCII data from one window to another, not the ability to provide dynamic data links or to include, for instance, a Lotus 1-2-3 graph in a WordStar document. Plus, they don't provide a great deal of ease of use. To run a spreadsheet in one window, a word processor in another and a communications package in a third with these environments, you still have to learn the different command structures of each of those programs as well as the command structure of the environment that integrates them.

The last big point of difference between these programs and machines is the question of concurrent operation or multitasking of multiple applications. In a system such as Lisa, for instance, the user can actually have

several programs running at once in different windows. Concurrent PC-DOS and Core Executive both offer a similar capability on the IBM.

Hal Stegar, product manager for Digital Research's Concurrent PC-DOS, explains the advantages of concurrent operation. "Say you have dBASE II. It could take 15 minutes to an hour to sort a dBASE II file," Stegar says. "With concurrency, you could get that sorting started and then go to another window and work on 1-2-3 or WordStar.

"Communications is really one of

*The last difference
is the question of
concurrent operation
of multiple applications.*

the main uses of concurrency," Stegar says. "Right now the only way to do communications is to have a personal computer that's dedicated solely to it. With Concurrent PC-DOS, you can do your communications in the background and your other work in the foreground." Hunt agrees. "Terminal emulation is an ideal application for our product," he says. "You can have one of your applications be a terminal emulation package that's communicating with a host mainframe. So you can in effect integrate a timeshare program in the background while you run something else in the foreground."


Since the IBM Personal Computer wasn't really built for multitasking, there is some performance degradation—slowing of applications—associated with the packages that use it. "Performance degradation was one of my biggest concerns when we were designing the product," Stegar says. "There would be some degradation if you were sorting four dBASE II files at once, because they're all CPU in-

tensive. Likewise if you were running four copies of WordStar at once there would be some degradation because that's all screen input and output. But you can sort a dBASE II file and type into WordStar without any noticeable degradation of typing speed.

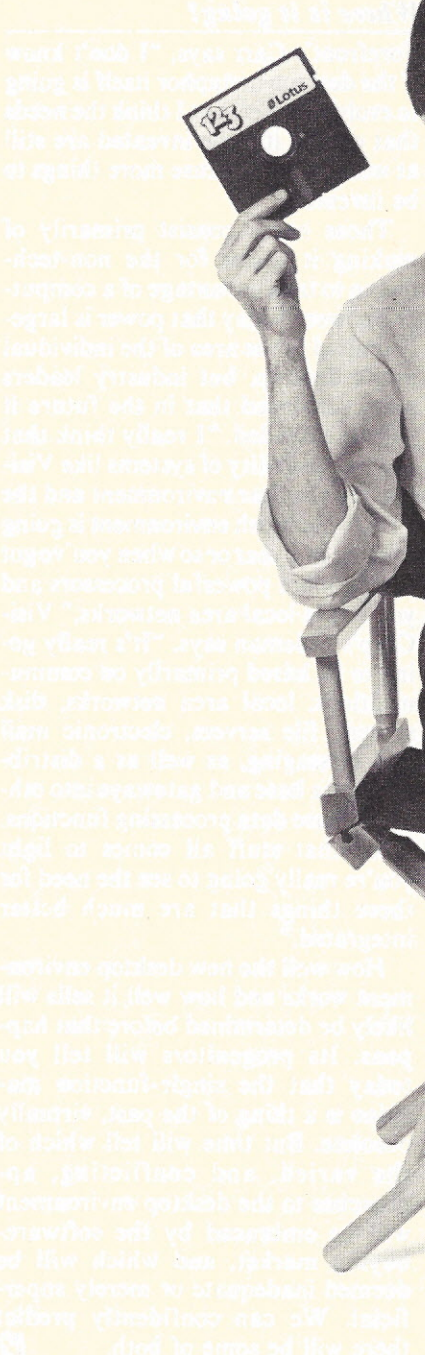
Where is it going?

Forefront's Carr says, "I don't know if the desktop metaphor itself is going to evolve further, but I think the needs that caused it to be invented are still at work and will cause more things to be invented."

Those needs consist primarily of making it easier for the non-technician to take advantage of a computer's power. Today that power is largely limited to the area of the individual user's desktop, but industry leaders seem convinced that in the future it will be extended. "I really think that the true usability of systems like VisiOn and the Star environment and the Lisa/Macintosh environment is going to come in a year or so when you've got a little more powerful processors and you've got local area networks," VisiCorp's Coleman says. "It's really going to be based primarily on communications: local area networks, disk servers, file servers, electronic mail and messaging, as well as a distributed data base and gateways into other in-house data processing functions. Once that stuff all comes to light you're really going to see the need for these things that are much better integrated."

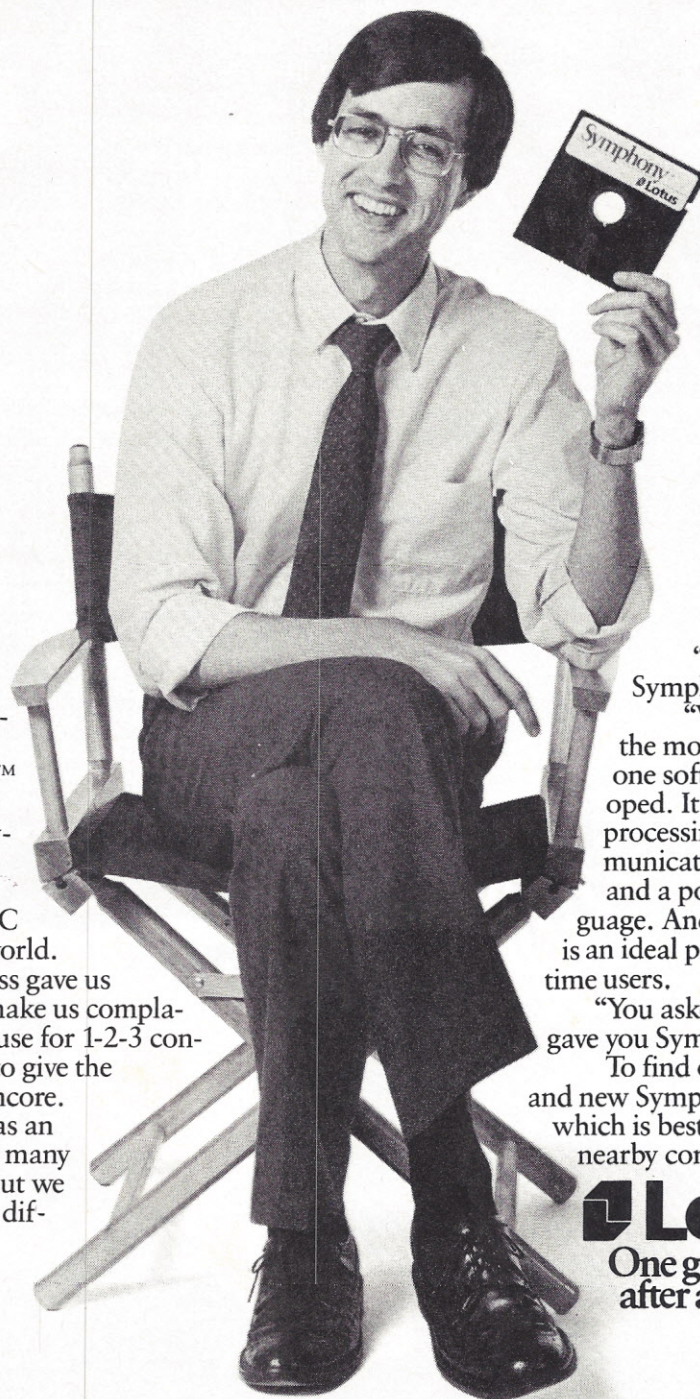
How well the new desktop environment works and how well it sells will likely be determined before that happens. Its progenitors will tell you today that the single-function machine is a thing of the past, virtually obsolete. But time will tell which of the varied, and conflicting, approaches to the desktop environment will be embraced by the software-buying market, and which will be deemed inadequate or merely superficial. We can confidently predict there will be some of both. 

all



Brian Stains is the Symphony Program Manager at Lotus Development Corporation. He was previously involved with the creation of 1-2-3 software and is one of the original members of the company.

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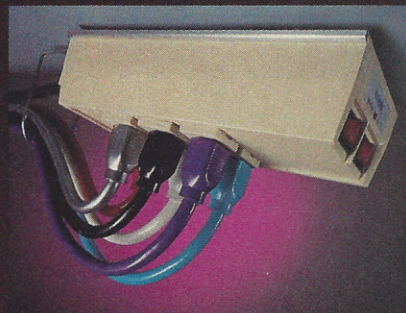
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CIRCLE 22

Saying It With Spreadsheets

The key to successful spreadsheet presentation is knowing what information to present and to which people

by Robert Sehr, Associate Editor

Personal computers equipped with spreadsheet programs have become potent tools for professionals battling for corporate attention. The power of an electronic spreadsheet has been well-documented—the what-if projection that was once the proprietary incantation of an in-house financial guru is now available to an executive at the touch of a fingertip. Unfortunately, the urge to find an audience for spreadsheets often produces little more than voluminous printouts. Too little attention is paid to carefully packaging the numbers to effectively communicate specific, predetermined points.

"If we hand you a personal computer and a word processing program it doesn't mean you're going to be a Pulitzer Prize-winning author," says Dash Chang, founder of Chang Labs in San Jose, Calif., and author of that company's MicroPlan spreadsheet. "The same thing is true with a spreadsheet—just using one is not going to make you a financial wizard, you're going to have to have some talent."

Not only do you need the talent to make sense of numbers, you will need a flair for communicating with pizzazz. Gone is the era when the corporate Bob Cratchit could just put simple numbers on a balance sheet. Today, spreadsheets must be carefully planned and tailored so that the important message they are intended to present comes across clearly.

Spreadsheet program creators have in fact—in all innocence—created a monster of sorts. Where once detailing what-if situations required long, expensive deliberations which dictated that no more numbers would be generated unless they were absolutely required, today's personal computer user can create a single model with Lotus 1-2-3, SuperCalc, VisiCalc or dozens of other programs and then use that model to calculate hundreds of what-ifs—whether they are needed or not.

Too many numbers

Just as a good editor can tell when a manuscript has been padded with unnecessary words, those who regularly read spreadsheets can spot one that contains a pointless excess of numbers. When these numbers are finally put together for a report, a business plan or a sales presentation, the seasoned spreadsheet creator will make sure that he weeds out the excess from his presentation—square root by square root.

"You have to overcome the tendency to overwhelm people with information," says Terry Duryea, a partner in the accounting firm of Deloitte, Haskins & Sells in San Jose. "It's just as easy to print out any relevant information."

Duryea notes one example where managers bent on demonstrating the efficiency of the corporate personal

computer often get carried away. In the course of creating a large model, the user might have made several little models to get to the higher level model. "It's not necessary to demonstrate each model," Duryea points out, "although they are frequently included."

But what is relevant and what is not? A new spreadsheet user may feel like a gourmand at a buffet table stacked high with every one of his favorite foods. You have month-to-month figures, day-to-day-figures, hour-to-hour figures. You can determine, if you want to, the impact on your glove sales if Michael Jackson suddenly decided to switch from wearing one glove to two. You can project the impact of a hot pennant race on ballpark hot dog sales. But if your team is in the cellar and destined to stay there, does it matter? How do you know when you've had enough? Is there a "Numbers Anonymous" organization for spreadsheet users? There is also the possibility that you may not have included *enough* numbers to make your point. Numbers after all, can be manipulated as easily as words. The same numbers that can plead poverty before the IRS can be used to show the shareholders the company's amazing recovery from a year-earlier term—if you know how to use them. How then do you make yourself perfectly clear?

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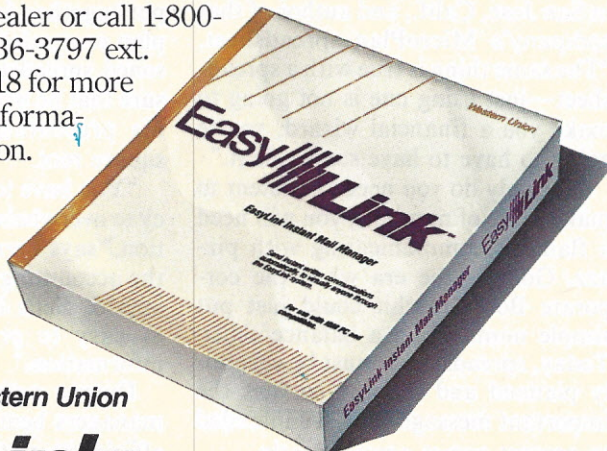
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the audience, Duryea says. "Some audiences might want figures horizontally, some vertically. Some want the bottom line up front, others want it on the bottom."

Knowing your audience

Knowing which audience wants what is a part of the preparation process, Duryea notes. If you have had previous experience with whomever you are presenting your spreadsheet to, you may know if he is an impulsive individual and therefore wants to know the bottom line immediately or if he is the deliberate type who must go through each step to find out how you reached your conclusion. In most cases, the answer will likely lie somewhere in between.

As a result, knowing your audience may be more essential in presenting a spreadsheet than the numbers themselves. Because personal computers have put spreadsheets within reach of practically anyone with a need to crunch numbers, spreadsheets are being presented to a much wider range of audiences. People who have had difficulty balancing their own checkbooks are being dazzled by numbers that have as much relevance as the blinking lights on Hollywood movie computers. "You have to keep it simple," says Joe Shelton, software product manager for Apple Computer's Macintosh team. "You should impress people with quality rather than quantity."

Shelton notes that there are some people who would rather read through lots of figures than through a lot of words, especially people used to dealing with numbers. There are others who would rather keep the numbers to a minimum. "What usually happens in a business presentation is that a single spreadsheet will be photocopied with a memo attached and distributed to everyone—instead of focusing on a particular audience," he adds.

The first rule to remember—be it the boss, a venture capitalist or your company's shareholders—is that any-

one sophisticated enough to read a spreadsheet is likely to be sophisticated enough to want to know about the assumptions that led to your conclusion. "Consumers (of information) would rather force a discussion of the underlying assumptions than stand for the revelation of more information than they wanted in the first place," says Evan Porteus, professor of management science who teaches an introductory computer course at Stanford University's Graduate Business School in Palo Alto, California.

In short, a spreadsheet should con-

"You have to keep it simple—impress people with quality, rather than quantity."

tain just the facts, not the environmental conditions in which they were reached. Few managers would write a memo about a sales meeting that described not only the results, but the color of the carpet in the room and the clothing worn by participants. Yet many spreadsheets are presented with superfluous numbers that mean nothing to their intended audience. For instance, the budget for a small start-up company that is growing at the rate of one employee per month does not have to break down the cost of recruiting and training new employees. Yet, since the numbers are there at the touch of a key, some users feel an obligation to use them.

To demonstrate some of the decision points in the creation of a well-presented spreadsheet, we will use one of the more important presentations, the common business plan, as an example. Business plans are usually distributed to bankers, investors and venture capitalists by entrepreneurs in search of funding. The recipient of the

business plan is usually looking for two things: the projected return on investment and the time it will take for the return to come in.

A business plan is more than just a presentation, it is an important document that must accurately reflect the abilities and circumstances of its author. "It's almost like a contract," says Eugene Kleiner, partner in Kleiner, Perkins & Caufield, a Palo Alto, Calif., investment firm. "To me it means that the people asking for money will do exactly what they say they will do with the money."

Eschew obfuscation

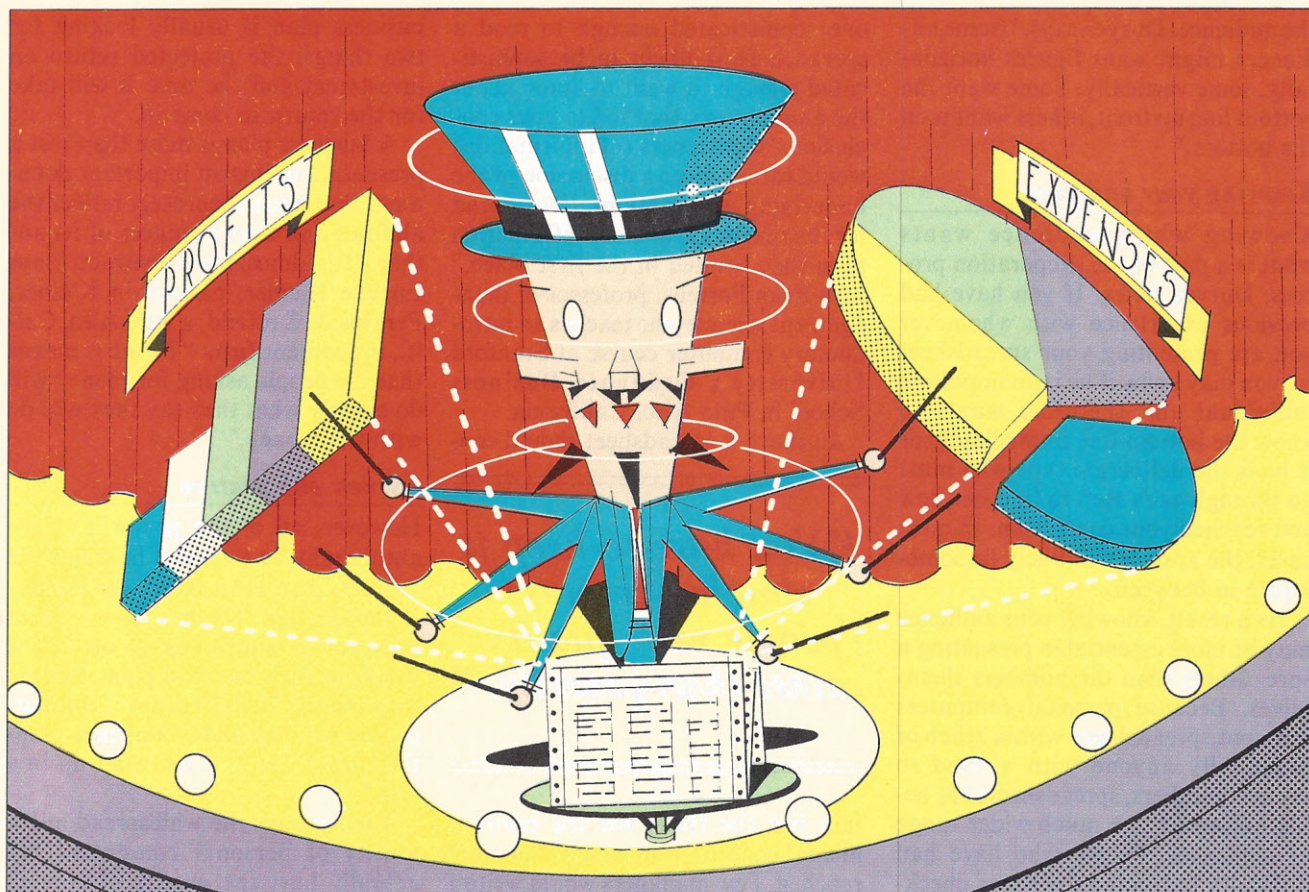
However, all of the goodwill of the author may be wasted if he treats the business plan as an exercise in numeric obfuscation. Kleiner says a lot of prospective companies go up in the smoke of their business plans. "Often they contain 20 to 30 pages of computer exercise," he adds. "Business plans that are 2" to 3" thick wind up in a pile."

Kleiner says the widespread availability of personal computers has actually hurt the quality of spreadsheets within the business plans he now receives. Ten years ago, when spreadsheets were done by financial people, they carried only the basics: an income statement, an expense statement, a listing of assets and, of course, the projection of return on investment.

Today, when anyone can do a spreadsheet in a few minutes, they often contain a long series of projections, Kleiner notes. "Usually they go the full range from optimistic to less optimistic," he adds.

Kleiner says all the numbers are not really necessary. "If I want to see a lot of projections, I can usually do them myself."

The problem has apparently become serious enough to launch a software program designed to take entrepreneurs by the hand and show them not only how to write a business plan, but to demonstrate the kinds of



Illustrations by Terry Allen

numbers needed to support each plan. The program, *Building Your Business Plan* is published by Cdex Corp. and was developed by Joseph Taylor, a Beaverton, Oreg., microcomputer consultant.

Critical numbers

Taylor, who has written his share of business plans and advised others on their content, believes that only three categories of numbers are critical to every business plan. The three include a profit and loss statement, an income/expense balance sheet and a cash flow diagram. These three will determine the ultimate bottom line that will either put a gleam in the eye of the banker or determine the weakness in the structure of the proposed business.

Taylor says he included other business-dependent modules in the

program, but these do not have to be used by every entrepreneur. For example, there are modules for retail and manufacturing inventory projections that need only be used by a few businesses in which inventory plays a major role in the bottom line. Many start-ups, for instance, contract out the assembly of their products, restricting their involvement to development and testing in order to keep their costs down. Most start-ups also do not keep a large inventory of products on hand, literally manufacturing to order.

Some of the more important numbers Taylor generates within the *Building Your Business Plan* program include gross margin percentage, expense percentage, average sales per employee, net income and the break-even point in sales. "These are pretty basic to any start-up," Taylor says. He

adds that the elements he chose to put into his program were selected as the result of his own experience in consulting with entrepreneurs starting businesses in the Portland, Oreg., suburb that has recently seen an explosion in the number of new high-tech companies.

Taylor points out that the program is not meant to provide a specific cure for all start-ups. "A software program is not going to be able to give advice," he says. "Entrepreneurs will have to make their own decisions."

Use a sneak preview

Once an entrepreneur decides on the numbers he wants to present, how does he assure himself that he has made the right choices before the business plan goes to the venture capitalist? After all, a small oversight may be crucial.



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For a clue to presentation strategy, we need look no further than the pros of promotion and presentation, Hollywood film producers. When movie producers want to assure the success of a "soon to be released" film, they will often release it in key markets for sneak previews. By previewing the film to a small portion of the intended audience, they can get a feel for how the film will ultimately go over—and make corrections if necessary. The same technique can be used with a business plan or another kind of spreadsheet presentation.

"It doesn't hurt to discuss the spreadsheet with someone who represents your intended audience prior to the presentation," Porteus says. This way, he notes, the presentation can be tailored to the audience's requirements.

Once you have prepared yourself

for your audience, you can decide what technology will best demonstrate your point. In the past year, the available choices have become as widespread as the available numbers. Today's software has made possible not only graphics that instantly adjust to a what-if projection, but word processing-style boldface and subscript. It's rough enough having to choose what numbers to present and now you have to choose what numbers should be presented graphically and what numbers should remain in numerical form.

Best of both worlds

Interactive word processing, spreadsheet and data base packages like Ashton-Tate's Framework and Lotus' Symphony now allow easy back and forth movement between spreadsheet and word processor so that each has

the best of both worlds. With this process, spreadsheet users can highlight, boldface and underline and use different fonts for the best possible effect for the ultimate audience without a lot of extra work.

But what of spreadsheet users who have already heavily invested in a spreadsheet? Are they doomed to columns of bland figures forever? As usual, an aftermarket is emerging for just such a purpose. Already, Solutions by Example, a Belmont, Mass., software start-up firm has created Reports by Example, a program designed to give users of existing spreadsheets the word processing powers inherent in the new integrated packages.

Edward Kahn, marketing director for the firm, says Reports by Example does boldfacing, highlighting and subscripts in conjunction with almost

WHAT THE PROS LOOK FOR IN A BUSINESS PLAN SPREADSHEET

If business plans are the entrepreneur's rabbit, then spreadsheets are his top hat. Spreadsheets generated on personal computers allow the potential entrepreneur to project every kind of eventuality that may affect his fledgling enterprise. Unfortunately, too often this power is abused to the point where the financial people must cut through a lot of unnecessary numbers in order to reach the meat which the business plan is supposed to contain.

What do potential investors look for when glancing over business plans? The following are the primary points culled from a poll of venture capitalists, bankers, auditors and consultants.

Is the bottom line clear?

Any potential investor looking at the numbers in a business plan is going to want to know how long it will take to recoup his investment. If it takes him forever to find this information he may also assume it will take forever to get his return.

Are you using the spreadsheet as a tool or are you looking to generate a lot of numbers?

By now most venture capitalists have

learned how to do what-if calculations on their own spreadsheets. It is not necessary to demonstrate your own expertise by generating a series of what-if numbers that amount to an empty computer exercise. The numbers you put in your business plan spreadsheet should be relevant to what's on the bottom line—simply listing your assets, liabilities, income and expenses. If applicable to your situation, you can include such things as sales per employee, inventory turnover and personnel costs.

Are your assumptions clear and well-defined?

The only thing worse than having unclear numbers is having unclear assumptions. It is very likely that your numbers will be checked and rechecked. In order for this to be done, the person doing the rechecking will have to know what assumptions were made in reaching the numbers. Are the projected numbers based on your situation and the market as it exists at the writing of the business plan or is it based on the hiring of certain people or the generation of a certain amount of publicity or the viability of a certain product? Be prepared to

backup each assumption.

Are your numbers accurate and current?

Just because the spreadsheet is done on a computer does not mean it is accurate. Besides typical typesetting errors, spreadsheet formatting programs may round off the numbers with progressive inaccuracy.

Is there a graph to tell the story?

Just as a picture is worth a thousand words, it follows that a graphic presentation of the bottom line will save a lot of time in evaluating your numbers. However, a graph should not be used to complement—not in place of the spreadsheet numbers—since these numbers tend to give detail that a picture may not be able to show.

If your spreadsheet is being presented graphically, have you provided the logistics used in plotting the graph?

Just as professional photographers will frequently submit camera settings with a photograph in order that the picture might be duplicated, spreadsheet graphics should indicate the plots used in the graphs so that they can be duplicated.



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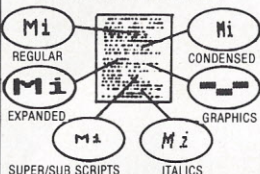
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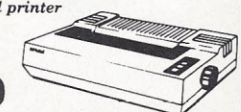
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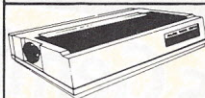


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any existing spreadsheet program (Multiplan is a big exception) that runs on the IBM Personal Computer. The program sells for \$195, but that price may be adjusted in the future, Kahn says, noting that competition is very likely to develop for this market.

Still, graphics is likely to be the most important enhancement in the presentation of a spreadsheet. Integrated graphics is credited for the meteoric rise of Lotus 1-2-3 and the related fall of VisiCalc in a one-year period. It gives the spreadsheet user a means of communication with audiences who are not used to dealing with numbers. The ability to instantly turn a what-if projection into graphic form through programs like 1-2-3, SuperCalc 3 and some of the newer integrated software has done much to equalize the burgeoning audience for spreadsheets.

Along with the opportunity for instant graphics with the new generation of spreadsheets comes the dilemma of choosing what to present graphically. Once again, you have to go back to understanding your audience and then consider what you are presenting.

Geoff LeBlond, co-author with Douglas Cobb of *Using 1-2-3* and manager of business software at Que Corp. in Indianapolis, Ind., says you should make sure that what you're trying to present doesn't get lost in the graphics. "The information you are projecting in graphic form shouldn't be too similar, but at the same time it should not be so contrasting that, for example, small numbers get lost among the larger ones," he notes. "You have to make sure you have the right mixture."

You also should make sure that time periods are even and consistent so that the information will graph out in proper perspective. If you plot annual figures next to monthly and quarterly figures your audience could be easily misled.

Once you've decided to use a graph,

you'll have to make a choice on what kind of graph to use. LeBlond says pie charts are best for showing parts of a whole, like company assets. Bar charts and line charts are best for following relative numbers like sales and expense figures.

Communications tool

When you present charts to someone along with the spreadsheet in which they originated, it is also important that you provide the settings you used in plotting the graph so that

Make sure that time periods are consistent so that the information will be in proper perspective.

the reader can duplicate your effort if he so chooses.

Graphics are after all a way of communicating. Not only can they make the digestion of numbers more palatable, often they can be a universal language that crosses all education lines. Dash Chang, whose Chang Labs distributes GrafPlan, another integrated graphics spreadsheet, recalls an incident concerning a manufacturer's distributor who used a graphic presentation to educate some employees on how profits are made and lost. Management at the distributor in question apparently had difficulty in communicating to his employees the relationship between inventory in the warehouse and the profit of each division. With the help of GrafPlan charts, management posted a series of bar charts showing the relationship of the inventory and profit for each unit and established a contest between the various units. By making a game of the process with graphics, employees in each unit of

the company who were previously unable to grasp the numerical relationships could easily view their progress with the numbers in graphical form.


Along the same lines, LeBlond notes that a lot of lawyers are beginning to contact his company for help in learning Lotus 1-2-3 because they have found that juries are able to get a better grasp of numbers when presented in graphic form in the course of testimony in a long courtroom trial.

Duryea of Deloitte, Haskins & Sells also believes in the power of graphics to add to the understanding of numbers—even to accountants. "It's very important to show your results in graphic form," Duryea says.

However, there are some in academia who fear that graphics may do for numbers what television has done for reading. "I worry about the trend toward showing everything in graphical form," says Stanford's Porteus. "The computer analysis becomes the equivalent of a black box; there is more going on outside the viewer and people can be easily misled about what assumptions have been made to reach the conclusion."

Such questions have, however, been introduced at each level of progress in the evolution of the relationship between man and machine. There may be people who will become more dependent on visual, machine-generated presentations to distinguish relationships between numbers, but for others, the new technology will be a spur toward greater understanding.

LeBlond says integrated graphics and spreadsheets are still too new to have reached a point of saturation. "Right now the more (graphic presentation), the better. I don't think we've seen enough of it yet," he says.

At the same time, there will always be those, like Duryea, who trust the machine only so far. "There is a danger in getting caught in the fallacy that if the computer generated it then it must be right," he says. 

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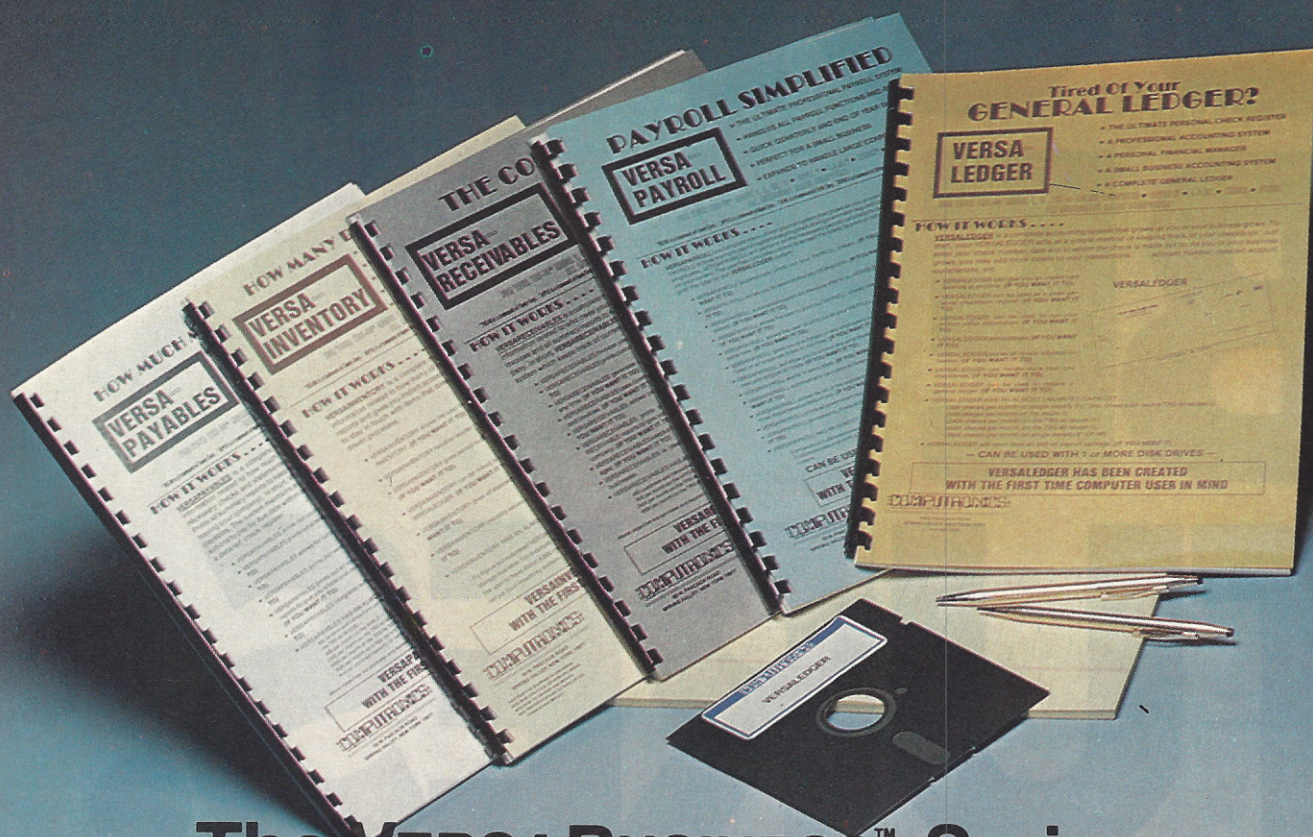
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Making A Habit Of Electronic Mail

For companies with the discipline to make it work,
electronic mail is coming into its own as a fast
and effective way to communicate

by David Gabel, Contributing Editor

Electronic mail was invented in 1838 by Samuel F.B. Morse, but it has only recently become a readily accessible business tool and personal convenience.

The telegraph was the first example of electronic—or at least electric—mail. That is, it was the first transmittal of textual messages over wires. But the telegraph, and systems that followed it, were inconvenient to use. At the very least, you had to make a telephone call and dictate your message to a clerk who would often get it wrong, so it had to be dictated again and corrected to get the electric mail on its way. On the other end, it had to be printed out and delivered manually.

With personal computers now coming into general use, full-fledged electronic mail can be very convenient. Two people with personal computers can exchange electronic mail with a minimum of effort. They simply set up their systems to recognize the same communications parameters, or protocols. These include baud rate (the speed at which communications will take place), error-checking methods, and phone numbers for the computer to call to initiate communications. Then one computer dials the other, the connection is made, and the data is transferred over standard telephone lines.

The result is easy electronic mail communications—people can communicate via personal computer with-

out leaving their homes. They don't even have to go to the mailbox.

Electronic mail requires an electronic terminal that can receive and display information sent electronically, a modem, (a sort of telephone for a terminal), and a telephone line. The terminal function is often handled by a personal computer which can be made to act like a simple communications terminal. There's a wide variety of modems on the market that range from the simple to the complex, with prices to match. (Some of the simple ones cost less than \$100.) And, of course, almost everyone has a telephone. To make things easier, you can use a terminal program—a piece of software that allows your computer to behave like a communications terminal, as well as saving transmitted information to disk and printing it on a printer. With these three pieces of hardware, which are essential, and the one piece of software, which is convenient to have, you're in business with electronic mail.

There are three basic ways to accomplish electronic mail. First, electronic mail can be sent and received point-to-point—from one personal computer user to another. Second, electronic mail can be sent and received through a third party. The third party receives the message from the sender, stores it for a period of time, and then forwards it to the recipient. This kind of mail system is

called a store-and-forward system. People who use the mail services of The Source or CompuServe are using a store-and-forward system. Finally, mail can be sent and received through a local-area network (LAN). This kind of mail is analogous to the inter-office mail common in business today. Using a local-area network, mail can either be handled in a store-and-forward manner, or it can be sent in a point-to-point manner, depending on the type of network.

Whichever method you choose, using the mail system effectively requires discipline. You have to check your "mailbox" regularly. As with written mail sent through the postal service, true communication does not occur unless the recipient actually reads the mail. In the case of written, traditional mail, we have acquired a certain discipline through years of cultural conditioning. When the mailman delivers mail to your house, you pick it up and read it out of habit. It doesn't take an inordinate amount of apparent effort. Using electronic mail, however, does require more *apparent* effort.

If you're using electronic mail through a third party, you have to call the third party to see if any has arrived. If it's point-to-point mail, you have to arrange a transmission time with the person you're communicating with, and then, usually, speak to him by phone to make sure the mail

will get through. With a network, you have to make the effort to see if there's mail in the box. This is actually less trouble than going outside your front door to pick up the mail, but it's not an effort that we've been conditioned for, which makes it a little tougher to do on a regular basis.

There are ways around that problem, though, and people are finding out how to make electronic mailing a nearly effortless process.

For example, there's a program called Transend III, from Transend Corp. in San Jose, Calif., specifically designed for Apple-to-Apple communications. This program has a number of features designed to make electronic mail easy. Chief among these features are the capability to set up "mailboxes" and "post offices" within the system, and the ability to delay calls until the long-distance rates are lower, as between 11:00 p.m. and 8:00 a.m.

Sherry Gerig is setting up a network of Apple II computers for the Mutual Security Life Insurance Company, of Fort Wayne, Indiana. The company's branches around the country need to communicate with the home office. As of this writing, only offices on the West Coast have been connected to the electronic mail system. But Gerig hoped to have 30 of her offices "on-line" by July.

"I use electronic mail," says Gerig, "to facilitate communications between the home office and our agents. I can get information out as fast as possible. And it's really simple."

Gerig explains that the real benefit of the mail system is speed. Often an agent will take an application for an insurance policy and forget to include some item of information that's required in order for the home office to decide whether to issue the policy. Without electronic mail, someone at the home office would have to call the agent who might not be in the office, so a message would be left for the agent to call. When he called, the appropriate person at the home office

might not be in, and so forth. Such "telephone tag" wastes time while the customer is waiting for an insurance policy.

Now, says Gerig, "If something isn't clear on an application, we can clear it up right away." Her department will type the message into the electronic mail system, using a built-in word processor, and tell the computer to send it to the appropriate post office. The computer has the phone number of the post office stored on disk. When the time comes for transmission, the computer goes into its

*Personal computer
users are finding out
how to make
electronic mailing a
flawless process.*

routine, sending the messages out to the appropriate post offices. "When you come in in the morning," says Gerig, "you have a log saved on disk. The log records what was sent out and what came in. All you have to do is read the log to know whether your messages were sent or not and what messages were received. Then you can print out the received messages and take the mail system down until you get ready to input more mail." If, by the way, the computer fails to make a connection, it tries again in an hour or so. If it tries all night and can't get through by the time you end the mail session, it records the fact that the message wasn't sent, and will add that message to the information to be sent in the next session.

Gerig says this timely message transmission is particularly useful in overcoming time differences between offices spread around the country. "We're here in Indiana," she says, "two hours ahead of the Coast. After about 1:30 out there, they can't really

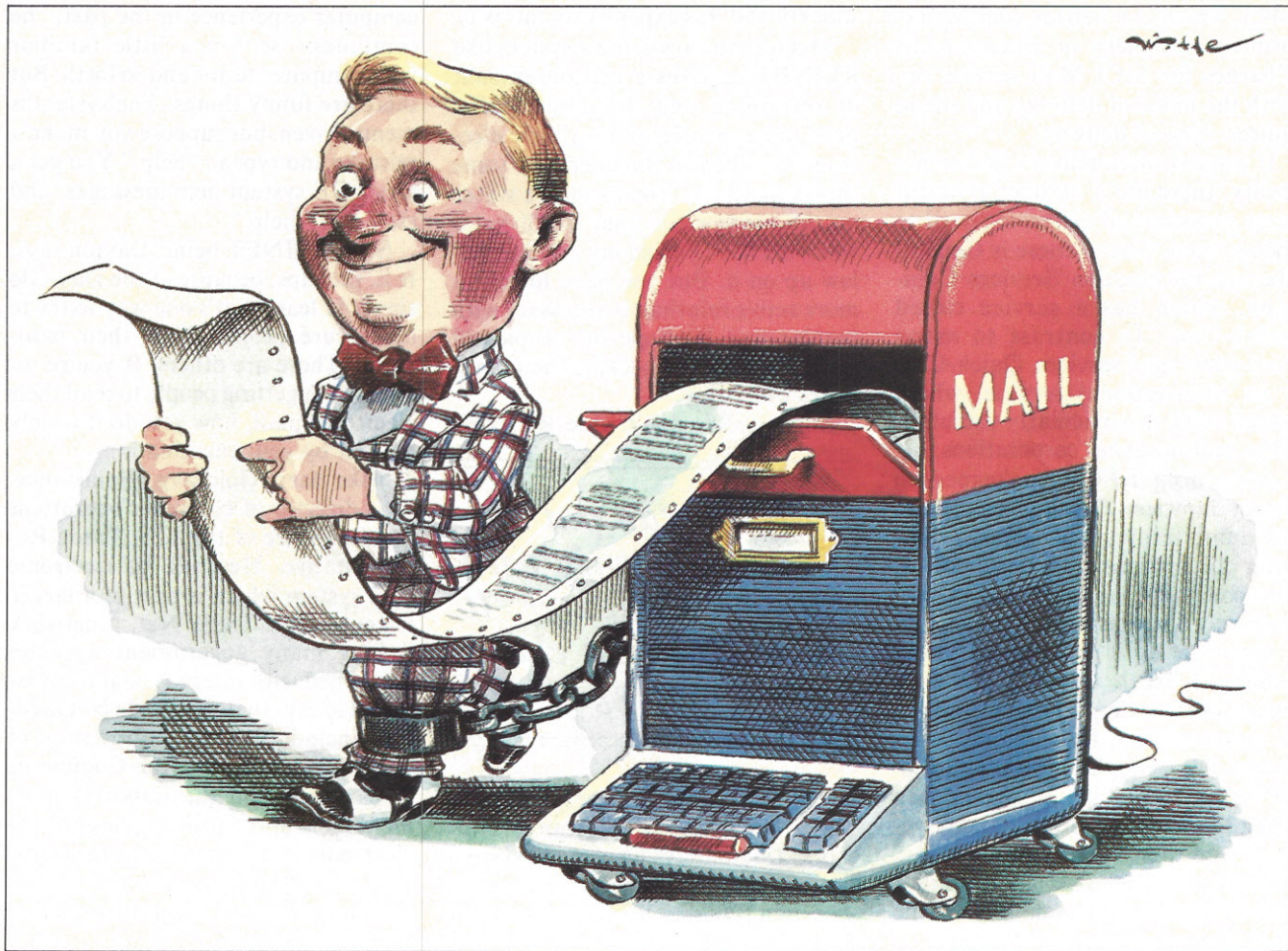
function. And we close at noon on Friday, so they just can't talk to people at the home office on Friday. But with the electronic mail, they can talk to me when I'm not here. Suppose an agent in California has a problem that he has to have cleared up. He can send a message to us at night, and we'll have it first thing in the morning. We can often have his answer waiting for him when he starts work."

Employees in the field echo Gerig's enthusiasm. According to Llona Fennel, office manager in Fresno, electronic mail is a real convenience. "We're three days by regular mail from the home office. Express mail costs about \$10, and we can't guarantee when it will arrive. But the electronic mail gets messages out overnight every time."

Fennel says her office has been involved with "fine-tuning" the system, and so hasn't really explored the full potential of the system. For example, there are not, as yet, any "mailboxes" on her system. Mailboxes would allow confidential messages to be sent to particular persons in the office. "The operator prints out a message for John Smith," she says, "and takes it to him. We may add boxes as we get into full swing." Still, the system is paying off. "It's so simple," she says, "You just put in a disk and a menu comes up. You select 'receive mail only' or 'send and receive.' Then you go home. Usually our operator takes messages up until four o'clock and then closes the system. The only thing you have to remember is to check the log in the morning to see if you got anything. If you did, you select print from the menu. Printing can take 10 minutes, or a minute and a half, depending on the number of messages you received."

Third-party mail

If conventional mail had to be delivered point-to-point, or person-to-person, there probably wouldn't be much mail. It would just be too expensive to send mail to Boston from



Illustrations by Michael Witte

San Francisco, for example. While that's not necessarily true with point-to-point electronic mail, there can be cost advantages to using third parties to store and forward mail to addressees. Most information utilities that provide mail facilities have local access phone numbers so subscribers don't have to use long distance. Sherry Gerig says she calls late at night and uses 1200-baud transmission to keep the calls short, which in turn keeps phone costs down. But large volume could push up phone costs. Furthermore, Transend III works fine with Apples. But suppose you had an Apple in one office and a TRS-80 in another?

Third-party data banks, on the other hand, will connect with any per-

sonal computer. While the public information utilities are probably the best known of the third-party mail providers, there are many other services that can get mail out quickly and conveniently.

One of them is the U.S. Postal Service, whose E-COM service will deliver a letter for you within two days for \$.26. That fee is for a letter of one page. E-COM will accept your message at one of its serving Post Offices and then print it out, stick it in an envelope and deliver it like regular mail.

According to Frank DiPresso, E-COM sales service representative for the Postal Service at Huntington Station, New York, users pay a \$50 annual fee and the \$.26 per letter. The

minimum charge per year is \$56, for 200 pieces of mail, which is paid in advance and kept in an account against usage of the service.

Users prepare messages for transmittal and send them over an asynchronous or synchronous communications link to the serving Post Office, of which there are 25 in the country. Messages can be sent to the office nearest the sender's home or business, or to an office near the addressee. (At press time, the Postal Service's board of governors announced that it was beginning proceedings to discontinue the E-COM service within 30 days and was seeking buyers for its equipment in hopes that a private company would continue the service.)

A similar service is available from

MCI, which can deliver your mail on printed stationery or electronically. Charges for MCI Mail service vary with the mode of delivery and the required time of delivery.

If printed mail delivery isn't a necessity, there are a number of third-party providers of electronic mail to choose from. One of these is General Electric Information Services Company, which has a service called Quick-Com. In contrast to many third-party mail services, Quick-Com is an international service, which might make it particularly useful for large multinational corporations.

According to GE spokesperson Nancy Jameson, Quick-Com can use any dumb terminal or personal computer as a communications device. The company has used this system internally for a number of years, and is now offering it as a service to the public. "I use it myself," she says, "when I'm working against a deadline on press releases, for example. I can get the release to the appropriate people for review quickly. It's faster than going to the copy machine and copying it and then distributing it."

Kathy McGeehan is very familiar with the Quick-Com system. She's the marketing manager for REINET, a multiservice network for real-estate agencies that offers electronic mail among other services. REINET is offered over the GE Information Services network.

McGeehan describes REINET as a set of applications developed by GE and by the Washington-based National Association of Realtors, which markets REINET. "We have 700 real estate offices on-line," she says. "The network is very useful because of the time-zone difference." She says that a typical use of the electronic-mail portion of REINET would be for relocation services. If an agent had a buyer in New York looking for real estate in California, he could send out a message over REINET asking for a list of properties in the buyer's area of interest. Properties can be found more

quickly and less expensively this way.

McGeehan says using a system like REINET requires a certain amount of retraining and discipline. "You have to get people to open their electronic mailboxes. But there are some things that help. You can put a status on the message, so that you'll know when it's been picked up, and can follow up on it. But you have to take a more active role than is necessary with regular mail. We hope that people will get in the habit of checking their mailboxes every day."

Some people don't. One REINET

*"You can put a
Day-Glo orange card
on your computer. It
says 'Did you check
your messages?'"*

user is Al Dayton Sr., president of A. Dayton Realty in Bayshore, New York. Dayton says he uses the system for its national property listing service, as a property listing tool, and for the mail feature. Dayton uses a TRS-80 Model III and a communications program from Radio Shack for electronic mail.

Dayton only opens his mailbox once or twice a week, and says he doesn't feel the need for more than that now. But he does have a message out to all members of REINET in the tri-state (New York, New Jersey, Connecticut) area about a potential buyer he has, so he knows he does have to check the mail to see if someone has a property this individual might want. How does he remember to check? "There's a Day-Glo orange card that you can put right on your computer," he says. "It says, 'Did you check your messages?'"

Dayton recommends that users take advantage of the training courses offered by REINET. "I've had some

computer experience in the past," he continues, "so I'm a little familiar with computer terms and so forth. But there are funny things. The system is menu-driven, but suppose you make a mistake and type in "help." You get a lot of GE system help messages, and they don't help."

Still, REINET helps, Dayton says. Is it, perhaps, because of the Day-Glo sign? At least that's one way to try to make sure people check their mailboxes. There are others. If you're interested in getting people to read their electronic mail, how you do it is only limited by your imagination.

Take Barry Goldberg, for instance. He's director of computer operations for the Office of the U.S. Trade Representative. He uses an electronic mail system which is part of a larger system called Trade Net, a network linking many government agencies concerned with international trade issues. He says that the Trade Net facilities include a lot of information of value to agencies like the Commerce Department and the Labor Department. One of the principal uses of the electronic mail system is the transmission of position papers to the various persons who need to see them before they're presented.

Most people who use Trade Net use dumb terminals for their communications equipment, but, "We're getting personal computers in," says Goldberg. He says there are two personal computers now in his group, and there are others in different agencies that use his mail system.

"Mail," says Goldberg, "is just one service that's used by people in the trade area. We also use the system for calendars and for notes of upcoming meetings. We do what had been done before with messengers or mail."

The network route

Getting mail into a company is no real problem. It's what happens to that mail once it's in the company that's important. It can take hours for the mail to get from the mailroom to the

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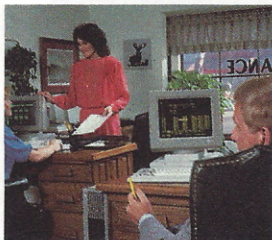
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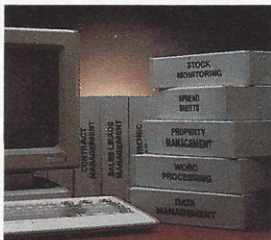
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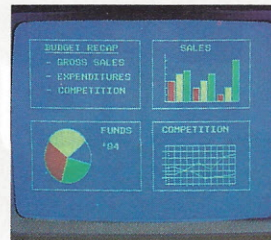
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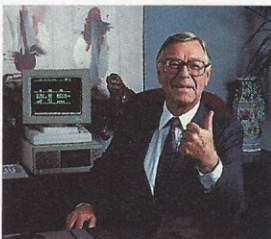
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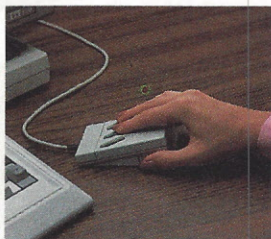
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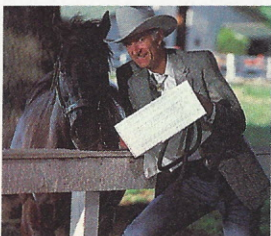
A MOUSE



REAL ESTATE



ACCOUNTING



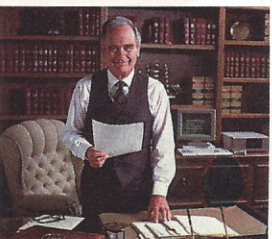
A SPREADSHEET



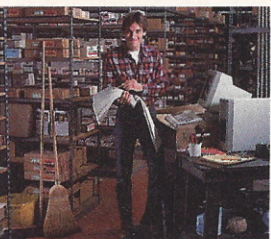
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CIRCLE 3



final destination. There are also problems inherent in internal communications such as memos and reports which should circulate smoothly, but often run into roadblocks.

One way to speed up corporate communications is to implement an electronic-mail system on a network of personal computers. Such systems can usually send messages to single users on the network, or to all users. But there are some problems involved in using local networks for electronic mail, one of which is the lack of multitasking capability.

Multitasking means that the computer can do more than one thing at once. It doesn't really, but it can do two different things so quickly that it appears to be doing more than one thing at the same time. Multitasking might allow a computer to run a word processing program, for example, while communicating on the network. Most personal computers can't do that, which means you have to leave your word processing program, or spreadsheet, or whatever you happen to be working on to get into your electronic mailbox.

"We've been uncomfortable with single tasking," says Marty Alpert, president of Tecmar in Cleveland, Ohio, which makes add-on products for the IBM Personal Computer, "that's why we've developed a system that allows you to run MS-DOS with a task in background." (For multitasking operations, memory is divided into sections called partitions. Normally the primary partition, which runs the primary task, or program, is called foreground, while the secondary partition, assuming there are only two, is called background. Typical background tasks include communications and print spooling.) "Say you're running 1-2-3," he continues, "and someone sends you a message. With our system you're notified right away, and you can look at the message without leaving the program you're running." The system is still in final testing stages.

In the absence of multitasking, messages sit in a message queue until the addressee checks his mail. It's the old mailbox problem again.

But once people are used to electronic mail, they get into the habit of looking for it. One company whose experience bears this out is Dana Corporation, headquartered in Toledo, Ohio. Dana is a major supplier of automotive, heavy truck and industrial components.

Dana is fairly new to electronic mail using personal computers. In fact, according to Herb LaButte, a senior planning analyst on the corporate planning staff, the company is new to electronic mail in general. But electronic news is old hat.


"We've had a broadband news distribution based on video monitors running about 15 years," he says. "The officers of the company all have had a video system on their desks." There is no MIS reporting system at Dana's corporate headquarters. "We're a very decentralized company," says LaButte. "The divisions are really autonomous. We only have about 85 people in corporate headquarters, and that's for a \$3 billion corporation. We wanted a way to disseminate information, but we didn't want a central data department." When headquarters needs computer services, he says, it uses the computer center of one of the divisions located in Toledo.

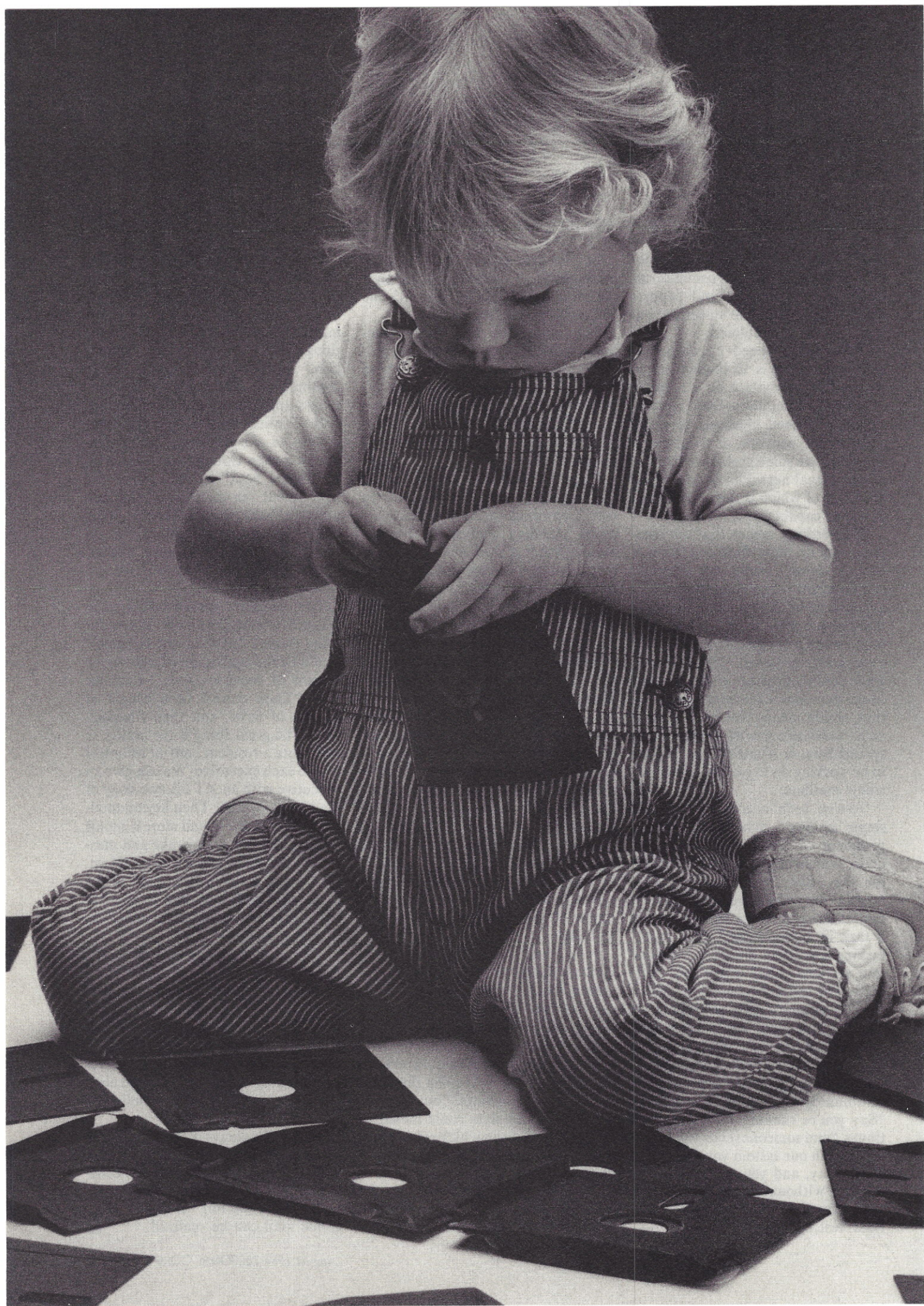
Now Dana is installing a local area network called 10-Net, from Fox Research, located in Dayton, Ohio. This network, based on the IBM Personal Computer, allows connection of multiple personal computers and the sharing of resources like printers and hard disk drives. "We're keeping the video system," says LaButte, "but only for TV data." Such data could include a view-graph slide on which relevant information is written in grease pencil, and the slide is then stuck in front of a TV camera for transmission over the network. Current stock prices could be quickly updated in this manner.

"We're converting the computers one-by-one into the LAN," LaButte says. "I've designed some front-end menus to allow for getting the information the users want. One of the nice things about our prior video installation," he continues, "is that we can continue that and bring in the computers and use the same monitor for both. We just switch from the video system to the computer as needed. We've gotten through some pilot installations now," he says, "and we have about ten stations on the network. Probably four of those are doing daily mail, while the others are involved in office-automation things. We'll probably wind up with 40 stations doing mail."

The computer system offers some distinct advantages over the older video system. "Mail on the computer would be the equivalent of eight or 10 screens of company data," LaButte says. "Then there'd be a couple of screens of news, and then financial data. The great thing is the ability to distribute a resident copy of information to each executive. We can give an executive with an XT his own copy of the company data. Then he can modify it if he wants to and store it on his disk. If he makes a mistake and messes up the data, there's no problem. All he does is get another copy of the distributed data and save it. We can make sure that our executives get the data they need."

Electronic mail can save time and money. It can ensure that the information gets to its destination, and gets there quickly. That transmission can be simple—a one-page memo, or complex, like company financial information broadcast to corporate executives on a network. It can be delivered electronically, or printed and delivered manually.

The technology is in place—the remaining roadblocks are human ones. Once people have become accustomed to electronic mail and its requirements, the full benefits of electronic mail can be realized. 



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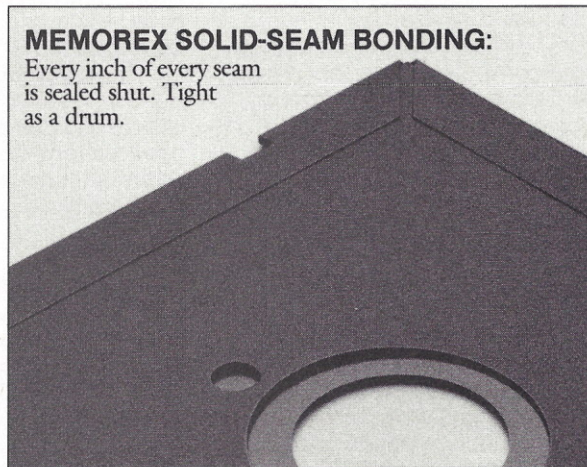
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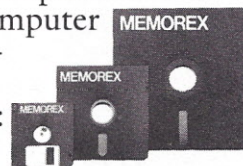
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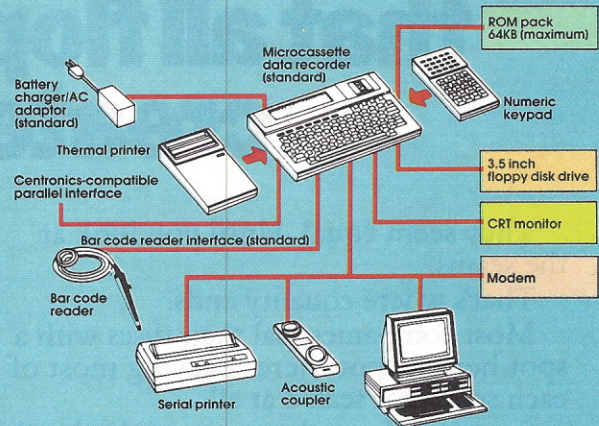
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The Big Board Connection

Computer-guided investment tools which deliver powerful benefits to Wall Street's heavy hitters are now becoming available to individual investors as well

by Richard Satran

In two years of running his computer-based discount stock brokerage, Max Ule has seen his share of system crashers. So when a certain "War Games" signs on at 5 p.m. when the system goes up, Max isn't alarmed. "He'll be bored soon enough," says Max. "I don't think he wants to play the market."

Using an easily accessible phone number, any hacker can get into the computer system which initiates millions of dollars of trades each year. But all War Games can pull down from this system break-in is a programmed sales pitch on Max Ule, discount broker. Legitimate investors, however, can use this link to set up a fully transactional brokerage account that offers free access to Ule's data base of stock quotes, reports and published articles.

Computer-guided investing has become the modus operandi of most Wall Street professionals. The reason is simple. As the old axiom says, "Money flows to where it makes the most money." As soon as the appropriate personal computer technology became available, the major fund managers, like Batterymarch in stocks and C and D in futures, took advantage of it to move quickly to the front of the pack in gaining return on investments and, thus, customers.

Richard Satran is a New York-based financial writer and reporter.

Increasingly, the same tools that benefit the professional are becoming available to individual investors. Aside from price breaks on hardware, the biggest lift to the "amateur" stock trader has been the willingness of data banks, which once catered only to Wall Street's heavy hitters, to scale down non-prime time prices for sale to the general public.

There's no sure thing

With competition heating up, consumers have more choices every month. In this expanding sea of computer-based financial products, however, the uninitiated investor who blindly stumbles into one of the sophisticated data bases can be as out of place as War Games was.

How do you convert what might be expensive toys into valuable tools? The first step is to accept the knowledge that the products are just that—tools. Virtually all of the packages require some prior knowledge of how the markets work. Even before connecting a modem, the novice investor should pick up and scan a few basic books like *Understanding Wall Street*, or the misleadingly titled, but otherwise sound, Andrew Tobias book, *The Only Investment Guide You'll Ever Need*.

Regardless of how good a program is, it doesn't replace sound judgment. "Computers tell you what has happened, not what will happen,"

says Glen Nelson, a floor broker at the New York Stock Exchange, who uses his IBM Personal Computer at home to enhance his trading abilities. While computer-guided chart systems can "forecast" price movements, their reliability still depends on being fed the right market variables. Even the most advanced systems can't give a true insight into the market, they can only support such insight.

The wide array of software products on the market, in part, reflects not only the immensity of this pool of information, but also the many methods of making money on stocks. Clever investors find ways to turn profits on such market esoterica as asset plays, turnaround situations, put-and-call options, risk arbitrage, emerging growth stocks, market timing of cyclicals, high-techs, sector rotation and dividend discounting . . . just to name a few. It follows that programs have been written and marketed that do everything from making simple price charts to analyzing an elaborate combination of market factors, economic trends and individual companies' performances through use of multiple regression technique.

The path divides

Most programs bunch into two main areas, the technical and the fundamental. Technical analysis makes determinations of how the market is viewing companies' stocks by watch-

PERSONAL PERFORMANCE

ing only their price movement and trading volume, with no reference to outside, non-market factors. Fundamental analysis attempts to find the strengths and weaknesses of the companies, using all available financial data.

To do either kind of analysis, you first need the raw data. Until recently, the general public had to find that information mostly by digging through newspapers and magazines, companies' annual reports and other print sources. The source for stock quotes was either your friendly local broker, if you were lucky enough to have one, or tomorrow's newspaper.

The price ticks from Wall Street have been the focal point of the investment world since the days when quotes were disseminated through oracular-looking, glass-domed telegraph terminals, which were set up at most local brokerage houses. "The tape offers a free show and a fascinating one," wrote one of Merrill Lynch's best-known partners, the late Louis Engels, in his now quaint 1950s classic, "How to Buy Stocks."

Were he with us today, Engels would marvel again at his own Merrill Lynch, which recently entered into a partnership with IBM to provide financial data. Initially, it will broadcast across public television's vertical blinking lines at up to six million information bits per minute. Details are still sketchy on the partnership's system, but the plan is to first put brokers on line for stock quotes, financial data and news. Meanwhile, software is being developed to manipulate the data. Indications are that the International MarketNet, as it will be called, will reach far beyond Merrill Lynch's 50,000 brokers. By using satellite broadcast technology, the system will allow anyone receiving a public television channel, via antenna or cable, to tune in; beyond that, you need an IBM Personal Computer and a decoder. Merrill Lynch says it hasn't yet worked out the cost to end users.

Even with the advancements in telecommunications and computer technology, though, small investors are still grappling with the age-old problem of gaining access to information in a business in which there are no free lunches. It's not cheap to assemble good, timely data, regardless of how economically it can be delivered. And as professional users shorten their connect time with new techniques and software, data bases must raise their rates to cover costs. Because of this, the data bases have posted a rate structure that is expensive—averaging over \$1 per minute, according to the *Wall Street Computer Review*.

For personal computer users this means they must also develop strategies for gaining the most information in a given amount of time. Retrieval software can help, but the investor should explore the dozens of utilities and large consumer bases to learn their content and costs.

Daytime rates, of course, are based on the high rates businesses can pay for tapping into the systems. But since most home computer users sign on after 5 p.m., they can take advantage of sharply lower nighttime rates. Some business data bases like National Computer Network of Chicago and Data Resources have attempted set up direct numbers for nighttime use, in an attempt to market their down time. But a Data Resources executive says, "This hasn't caught on very well." Basically, the problem with some of the business suppliers is one of rationing demand to the general public—in short, the marketing to a general audience. Some have been "discovered" and are jammed nightly with calls. Others are left alone. Many offer strong services for trained daytime users, but provide few comforts to the nighttime user.

Exploring the strengths and weaknesses of systems is important, because of the cost of connect time and the importance of your investments. The systems can be

extremely complex to use, or relatively simple. Some require a knowledge of stock symbols or other specialized information.

Normally, it's a good idea to get your thoughts together before dialing, and have a search strategy ready—perhaps even typed on your disk—before you dial. The costs can mount quickly. Know the costs ahead of time, or if you run into a grey zone, where you are unsure of costs, sign off quickly and find out what you're getting into. Delphi and CompuServe have add-on rates for financial data ranging from a small one-shot access charge of \$1.00 to \$50 per hour.

Some of the utilities and data bases give free demonstrations. The idea is to make money, not burn it. But keep in mind, though, your initial trial and error will be a learning experience, and it's bound to cost some money.

The range of what you may discover in these forays might astound those unfamiliar with what a data base can offer. You can find electronic copies of the *Harvard Business Review*, hundreds of investment newsletters, stock recommendations, every statistic on company performance which is required to be reported to the Securities and Exchange Commission, listings of new issues, entire texts of many leading newspapers and wire services, lists of financial ratios on companies, and more. At this very second, data is streaming into the mainframes of the data compilers at a furious pace; marketers are anxious to disseminate the information, and to do that they will offer some startup costs or services quite inexpensively.

The bottom line on all of this is that you are in a buyers' market. The utilities and data bases are aggressively shopping for your business, so you should sort out the offers. It's no cliché to point out that this a new business, and there is no "standard rate" from one company to the next. Rates for data vary incredibly. The exact same bits of data on different

The utilities and data bases are aggressively shopping for your business, so sort out the offers.

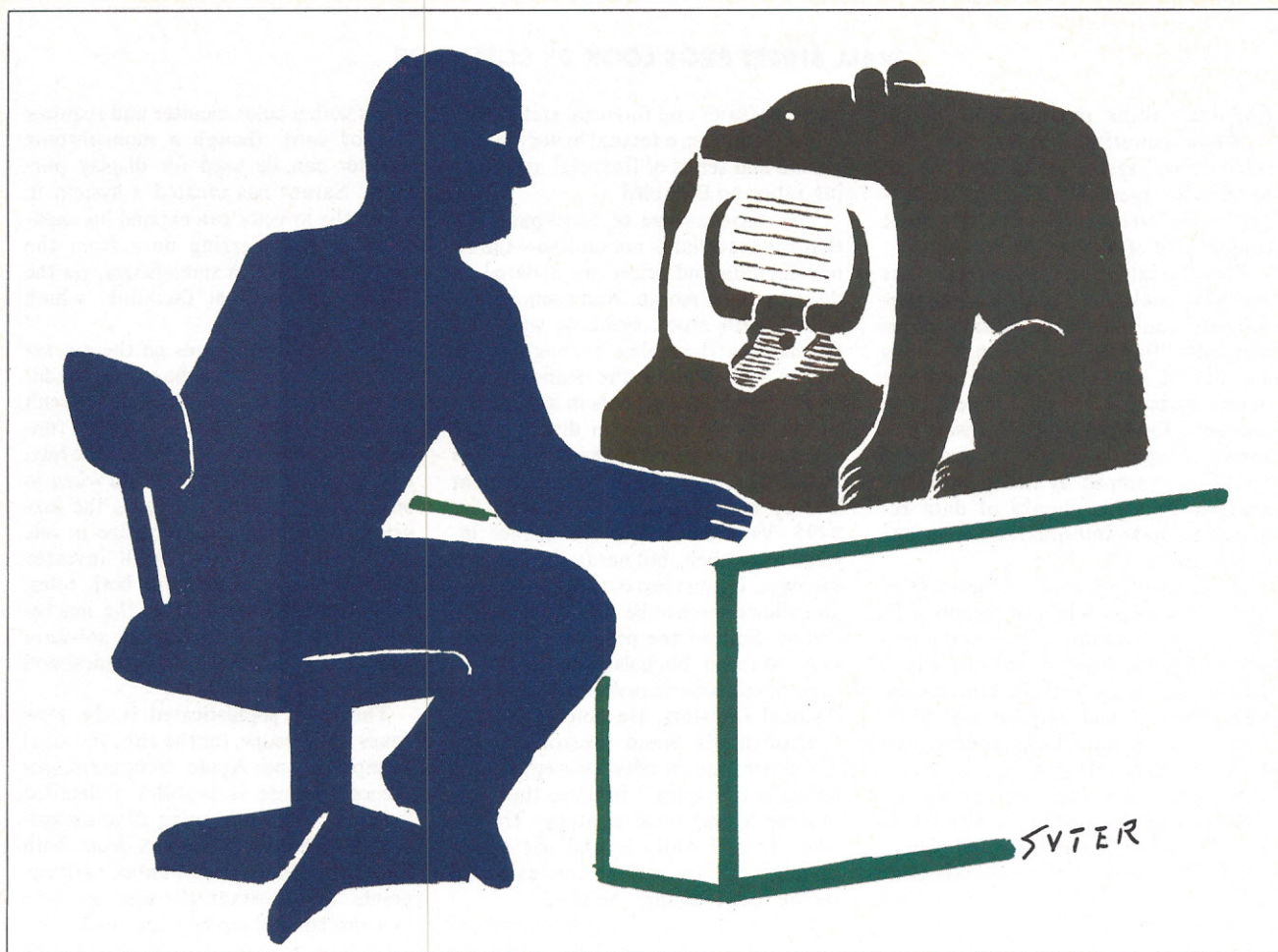


Illustration by David Suter

utilities can vary by as much as 10 times from one company to the next. You better shop around.

The cost of stock quotes gives as good an example as any. The discount broker, Max Ule, gives free end-of-day quotes on about 2000 listed companies to his loyal customers. There is no minimum number of trades, but total freeloards are dropped, in time, while low-volume customers are allotted less access time. CompuServe and Delphi have services which list quotes for a fee. MicroQuotes, on CompuServe, provides an entire month's worth of closing prices at a cost of 15 cents, with a minimum of \$1 from a data bank going back to 1973. On the same utility, Quick Quote gives quotes in prime

time at 10 cents and after hours for two cents. Closing prices on Dow Jones are figured at a rate per minute. Daytime users can pull in up to eight quotes per minute at 300 baud and 25 at 1200, with a rate fixed at \$1.20 per minute for 300 baud or \$2.40 for 1200 baud. These stock quotes are delayed only about 15 minutes from the actual floor trade. At night, the rate for end-of-day quotes drops to 20 and 40 cents per minute for 300 and 1200 baud, respectively.

If you want to take the big plunge and link up to the New York Exchange ticker where you can view all the trades with a 15-minute delay, this can work out to about \$20,000 per year for a non-professional. But

the Exchange also has a slow-speed, real-time ticker available at a much lower cost. It runs at about 135 baud, compared to 960 for the high-speed wire, and deletes some prices to keep current. This ticker is available to the general public at about \$135 per month (including telecommunications charges) plus a \$150 hookup charge.

Don't be disappointed if your personal computer can't deliver instantaneous prices in an affordable manner. Anyway, the best strategy is to develop long-range investment goals that don't require that you know the price of a stock through each of the thousands of trades taking place each day.

Wall Street appreciates growth like nothing else, and for good reason: It

PERSONAL PERFORMANCE

WALL STREET PROS LOOK AT SOFTWARE

"I don't think most people realize how powerful this new financial software is," says one old Wall Street hand who specializes in computer-guided *arbitrage*, perhaps the most complicated of all trading disciplines.

This "arbitrageur" maintains that available packaged personal computer software can't quite do justice to his method—"finding out when markets are out of equilibrium and making money by buying on one and selling on another." Even the most expansive personal computer-based spreadsheet would be swamped by the quantitative analysis on huge chunks of data required to make inter-market, arbitrage comparisons.

On another corner of the Street, Dick Sharnon, vice-president of corporate finance at E. F. Hutton, believes the personal computer has "arrived" already in another highly sophisticated investment field, mergers and acquisitions. Sharnon believes that the Standard and Poor's Stockpac II, which runs on an IBM Personal Computer, provides all the power needed by Hutton analysts to screen takeover candidates for clients. The department is now experimenting with the package (available for the IBM Personal Computer and Apple computers from \$295 to \$1000, depending on the number of diskettes) to replace the mainframe, time-share equivalent that's both costly (\$40,000 a year for licensing, plus \$35 to \$100 per screen) and inflexible.

How does it work? First, it organizes data on thousands of companies. "You can go crazy sifting through the newspapers, financial press or whatever," says Sharnon. "With Stockpac you can find 50 companies that fit your criteria in two or three minutes." If your criteria is high yield (dividend income) you'll receive a list of the top 50 companies fitting the bill.

In another mode, the data can be massaged. You could ask for a specific ratio for all 50 companies, like sales to earnings, or assets to liabilities. Or you could enter a command to dig out all of the available data on each company—there are three pages on each, including

earnings/sales and financial statements on the first page, a textual history on the second and series of financial and trading ratios on the third.

The disadvantage of Stockpac II is that the material is not on-line—the financial data and prices are updated on diskettes each month. And users not familiar with stock symbols will find themselves thumbing through stock guides a lot because the Standard and Poor's people use symbols in most of the modes, to economize on disk space.

On the other side of that trade-off is ValuePac, the Value Line Investment Survey software package listing for \$495. Value Line uses full names instead of symbols, but naturally this uses up space. It gives less data on companies and allows fewer to be retrieved on each screen. Both of the programs are fine, says Norman Nicholson, of the Chicago-based American Association of Individual Investors. He notes that such fundamentally based investment programs are "the soundest strategy for the individual investor," because they emphasize a long-term strategy. Traders who are constantly in and out of the market "can find themselves eaten up by the commissions," he says.

Still, Nicholson says, sometimes the technical programs do work. "Back in 1982, at the beginning of the bull market, the technical programs were giving buy signals and a lot of people made money on them," he says. One vendor of technically based investment programs, Savant Software, gets around the problem by avoiding any "buy" signals. Savant's marketing director, Paul Langston, says such indications are misleading. He notes that "If their buy/sell decisions were so good, those people would be millionaires, they wouldn't be writing software." Savant has taken a more humble approach, offering users a simple charting program for \$395. Using this program, investors may draw their own timing conclusions. This system retrieves data from either the Warner Communication System or Dow Jones News/Retrieval and quickly displays price/volume charts for any of the stocks covered by those data bases. It

works with a color monitor and requires a color card, though a monochrome monitor can be used for display purposes. Savant has created a system in which the investor can expand his capability by transferring data from the chart program to a spreadsheet, via the Savant Spreadsheet Datalink, which sells for \$95.

While most programs on the market fall neatly into the technical or fundamental categories, most decisions aren't that simple. Many experts say that fundamental analysis tells you *what* to buy, and technical analysis tells you *when* to buy. While professionals have the luxury of being able to specialize in one field or another, the small investor sometimes has to perform both roles. Dow Jones has brought to the market the first of the multifunction software packages, combining both technical and fundamental analysis.

The more sophisticated is the Dow Jones Microscope, for the IBM Personal Computer and Apple computers, so-named because it provides a detailed "picture" of a stock, using 20 of a possible 68 different indicators from both technical and fundamental vantage points. In an instant, the user can type in a symbol and see how the stock rates on key financial ratios and stock price/volume criteria. Another package, The Dow Jones Investors Workshop, moderately priced at only \$149 and available for Apple computers, manages a portfolio of up to 80 issues, generates reports, charts stocks and performs other technical functions like simple averages and trend lines, and automatically integrates data from the Dow Jones News/Retrieval.

Regardless of which program is chosen, the investor should use the computer as a tool for determining which stocks meet his own predetermined criteria. Before venturing into the woods, the investor should have a good idea of what he wants to bring home and how he plans to do it. In cutting through a forest of data, the personal computer is a powerful tool. But the investor must have a strategy before he turns on the switch.

pays off. One example is the southern discount store chain, Wal-Mart. Its sales and earnings grew by an average of 40 percent during the past five years, and its stock followed suit. With the miracle of compounding interest, 100 shares purchased in 1979 has jumped in value from \$3000 to \$28,800. If you bought shares of the most widely held retailing industry leader, Sears, the same year, \$3000 of stock would now be worth about \$3500. This isn't to endorse Wal-Mart stock or knock Sears, but to illustrate the point that long-range strategies can pay off.

Some data bases list financial results as far back as the 1950s. This may seem like a lot of fluff to the average investor, but the fundamental analyst can gain strong insights from this historical viewpoint. For example, how does a given company bounce back from recession? Are years of large capital investments usually followed with strong earnings increases? And so on.

The ability to retrieve such information in seconds has been a boon for fundamental analysis. A search that might have taken hours is reduced to seconds, using text searches triggered by a single word or a set of key words. A user interested in finding the next potential Wal-Mart Stores might tap out "Discount stores," specify a year or a place, and receive a series of story headings. Perhaps, this textual search, the name of a company that sounds like a prospect will pop out. If it does, you might dig through the company's available financial statements and begin picking it apart.

Once you've downloaded the information, additional time savings are realized with a variety of software now available. One program, the Dow Jones Market Microscope, allows the user to simply type in the name of a company and immediately receive 28 separate pre-programmed ratios, like price to earnings, or sales to earnings, or return on investment. Another

type of data retriever, the Dow Jones Spreadsheet Link, allows the user to download data into a spreadsheet and quickly work through a series of what-ifs. What if sales increase by 20 percent? What will be the effect on sales if company A takes over company B? What will be the impact on earnings?

Allan Fuerenstein, who teaches a course on computer investing at New York University and is a consultant to Dow Jones, says that in two hours of such spreadsheet analysis, he can perform what took three to three and

Aggressive traders will also want to use portfolio management software.

one half weeks in pre-personal computer days. While fundamental analysis may be the best tool for the small investor, the preponderance of software now on the market continues to deal with the other major school—the technical analysis (or chart) programs favored by traders who depend on quick stock turnarounds. Their "art" requires a pinpointing of market factors that may be of little use to the smaller investor. These traders seek out points where resistance (selling), accumulation (consolidation) and support (buying) will be triggered. For the types of turnarounds these traders specialize in, the instant charts are invaluable tools.

In order to work, the charts really require daily updating, a task that may not appeal to the casual or part-time market watcher. And while the theory of charting is simple, users say the programs tend to be more difficult to master. Glen Nelson, a floor broker with 20 years experience on Wall Street, says he still found Market Analyzer difficult to master.


However, aggressive non-professionals will certainly want the support of one of these programs.

With computerized stock trading now readily available, a confident investor might very well even consider dumping his stock broker—particularly if all he's getting out of the relationship is a bit of information and a few stock quotes. C.D. Anderson, Niacom (on the Delphi utility), Max Ule (CompuServe) and Fidelity are all taking orders by modem.

Aggressive traders will also want to use some version of portfolio management software. They are among the simplest programs to set up and use, and for investors who make many trades, they will provide immense time savings and leave a record of gains and losses, which may be indispensable at tax time.

Many small investors have been glad that they bought a portfolio program at the point they first began to seriously play the market. Stephen Sandberg, a commercial architect based in Long Island, says he received a computer as a gift and "bought a portfolio program so I'd have something to use the computer on." He says it was a valuable learning experience, and he enjoyed watching his gains pile up.

While portfolio management software may do little to enhance your ability to make money, counting stock market earnings can be one of the most pleasurable ways to use a personal computer's video display.

Many experts do believe the computer can improve your chances of doing just that. Intuition, that deep, winning instinct that successful stock market people acquire over a period of many years, can't be called up on a template. As Dow Jones consultant Fuerenstein says, "Intuition will always be a big part of making money on the Street, but the more of these computer investment tools you master the better your intuition will be." 

Undo.Windows.

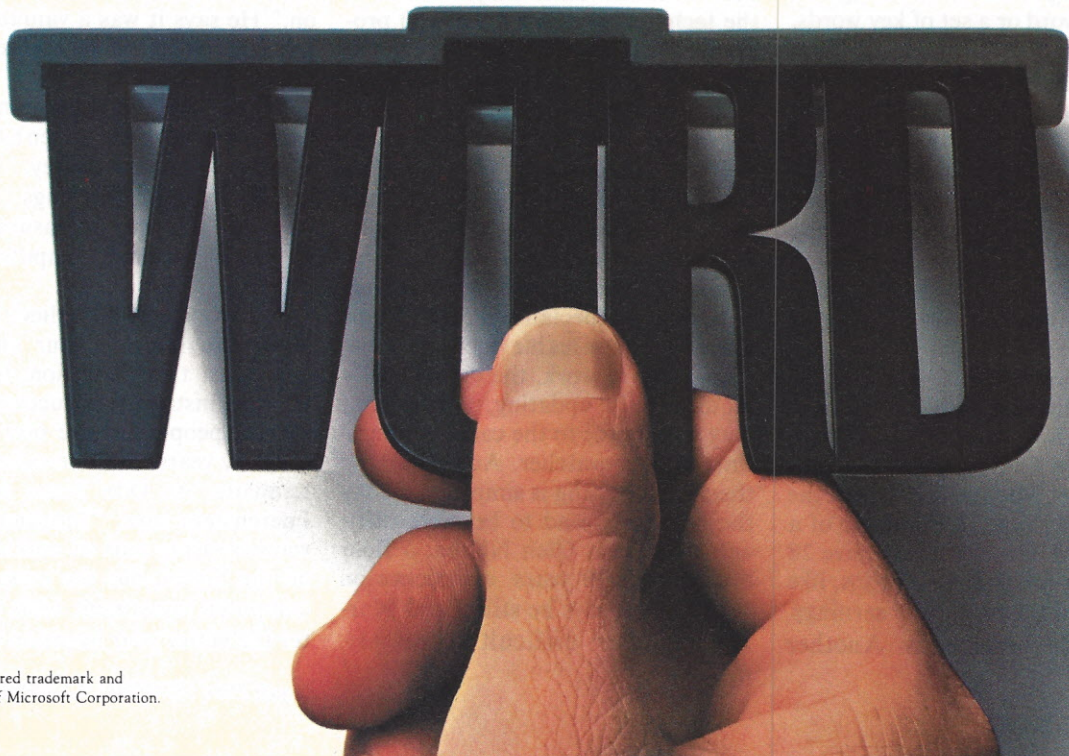
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How To Buy A Personal Computer

The process of buying a personal computer is time-consuming. Still, rewards are assured to those dogged enough to follow the process to its completion

by Charles Rubin, Contributing Editor

Not so long ago, it was fairly easy to buy a personal computer. There were two or three major brands, perhaps 25 software packages, and only a few stores from which to buy. With so few choices, you could be through the whole process in a weekend.

These days, you can still get through the whole process in a weekend. You can walk into a store knowing nothing about computers, and walk out \$5000 poorer a few hours later, knowing little more than when you went in. If you're lucky, the system you bought will be just right for you, but the odds are against it. With hundreds of brands, acres of computer showrooms, reams of advertising, and something like 90,000 individual software packages from which to choose, you would be lucky indeed to hit upon the right combination so quickly.

In fact, you will probably need to spend considerable time—as little as a few weeks and possibly as long as a number of months—learning what computers do and how they do it, deciding what you need to do and how to do it, and matching the myriad capabilities of computers with your needs.

Essentially, the process of buying a personal computer consists of a series of progressive steps. Owning a computer isn't like owning a toaster or a television, and buying one isn't like

picking a coat off a rack. There is, first and foremost, a lot to learn about a new technology and how it might help you.

After examining the general uses of computers and defining your general needs, the next move is to get specific. Along this route, you'll first need to zero in on specific software programs that you will want your computer to run. This done, you can then begin to configure potential hardware setups, including decisions on the amount of memory the system should have, how many disk drives to include—one or two—and whether a printer, color monitor or other peripheral devices are required for your computing needs. Once you have come up with a general sketch of the computer system that you require, it is time for further research. By this time, you will want to investigate as many product options as possible, taking into account factors such as ease of use, ergonomics, compatibility with other systems used by friends and colleagues, price and perhaps even a few forward looking considerations such as expansion possibilities and future resale value. Once you have a closely cropped outline of your requirements, you will need to find the right place to buy your computer, taking into account matters such as the store's pricing, service and any other support or convenience factors.

One enduring law of computer buying is that you have to be open to a lot of learning. You may already be prepared to learn once you get a system home, but the learning starts long before that. Don't fight it. You will have to be wary of a number of inevitable distractions that accompany any high-ticket personal purchase. Think of the process as balancing a scale. On one side are your needs, and on the other are the capabilities of the system you're shopping for. Your impressions can be tipped out of balance by irrelevant baggage. For instance, maybe you'll become emotionally attached to a particular model because you like the advertising campaigns that promote it. Or maybe a particular computer will take on false "weight" because of capabilities you don't need. Problems could also result from wanting a status brand, or one that everybody else has, or one nobody else has, or (worst of all) one that seems like a "good deal" financially. These distractions and others will tempt you from your central goal: buying a computer. It will take all your concentration to stay the course.

Among the distractions you can count on is undue fear of spending. It is of little use to worry about price when starting out to buy a system since yet another enduring law of computers is that they are expensive. Currently, in fact, they are the third

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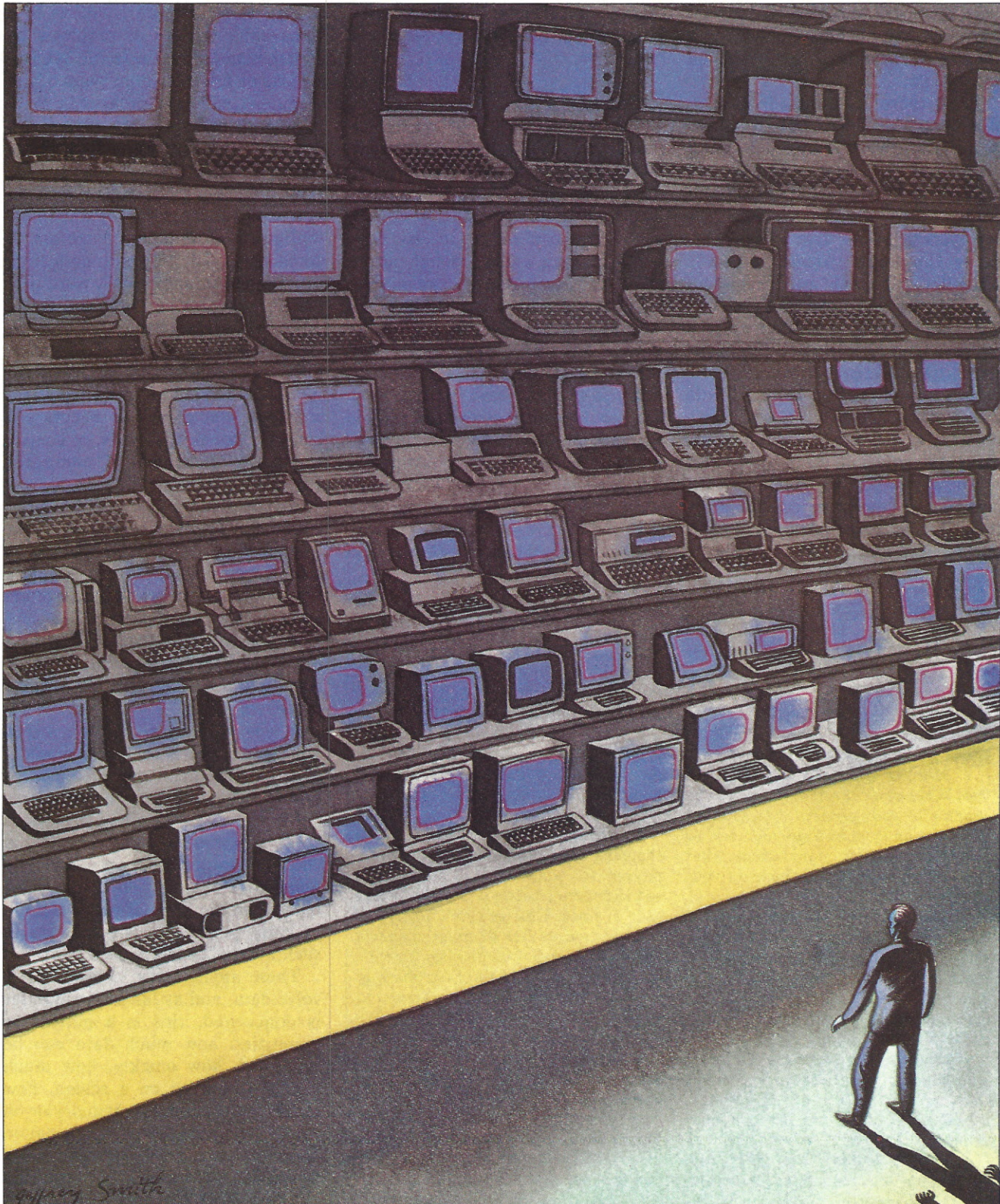


Illustration by Jeffrey Smith

Everyone's problems are a little different—and every computer's way of solving them is a little different.

most expensive purchase that an average consumer is likely to make in a lifetime—following a home and an automobile.

Then there is a fatigue factor. What seems at the outset to be a fairly straightforward matter becomes a maelstrom of abstract concepts and detailed specifications. Bizarre product names and unfamiliar workstyles can overwhelm you. Drawn by advertising that simplistically presents computers as quick and easy solutions to everyday problems, the hapless computer buyer is often stunned to learn that everybody's problems are a little different—and every computer's way of solving them is a little different. It takes research and introspection to tell which system offers the right solution for a particular buyer. When you are faced with the possibility of being overwhelmed by the countless levels of detail in computing, it might seem expedient to

turn to a salesman or consultant. However, a broader first step is a better one.

What's the problem?

Before you actually shop for a computer, you need to define your computing needs. But even this preliminary step requires some background. The first thing is to understand how computers can help you. By now, computers are a large enough part of all of our lives that we learn their basic applications almost by osmosis. You've probably heard a friend or co-worker talk about using a computer for word processing, spreadsheet analysis or data base management. Or, you've seen computer-related features in newspapers or national magazines. At this level, you probably don't know just how a computer works, and you shouldn't care. This isn't the time to get sidetracked with a lot of hardware or software details.

Computers provide solutions to a remarkable variety of problems by functioning as an electronic tableau for one or more of seven types of applications software programs. With data base software, for example, a computer can help you manage large record-keeping files. A communications program and modem will let you and your computer tap into information stored in other computers. A spreadsheet will help with budgeting or financial forecasting. A word processing program will help you write, edit and print letters or reports. Graphics programs enable the generation of charts, graphs, or even free-hand drawings. With educational software, the computer becomes a learning machine. Finally, of course, there are thousands of computer games programs.

As you discover the general applications of personal computers, your interest may be sparked by one or more specific uses. It's also possible that you won't be particularly interested in any computer application. If not, leave it at that. Advertising to the contrary, your kids won't flunk out of school if you don't get a computer.

If you do find a match between your needs and a computer application, you can then move in on a deeper level of knowledge in a more closely focused area. Matching your needs with a few specific applications should allow you to forget completely about irrelevant applications, and narrowing the focus of your research as early as possible is a blessing in such a complex and varied field.

These applications, obviously, involve data, and as far as a computer is concerned, this is a matter of quantities: how much data can be processed, how quickly, how much can be displayed on a screen, how much can be stored in memory or on a diskette, or how much can be put on paper in a certain amount of time. As you define your needs, it is helpful to quantify them. How many records do

EIGHT CRUCIAL STEPS IN BUYING A PERSONAL COMPUTER

1. Define Your Needs. The first determination you need to make is what primary uses you will have for a personal computer. Will the system be used as a productivity tool, to enhance personal performance or for other purposes?

2. Identify The Programs You will Use. What types of software will you be running in your primary applications? Do they have minimum memory or processing-related requirements that will determine the components of your hardware system?

3. Make A General Sketch Of A Hardware System. Based on your software specifications, determine how much memory your computer needs and whether you will need additional disk drives, a printer, a color monitor or other peripherals or accessories.

4. Consider Compatibility. Decide if your new computer needs to be compatible with others that associates, suppliers or customers are currently using.

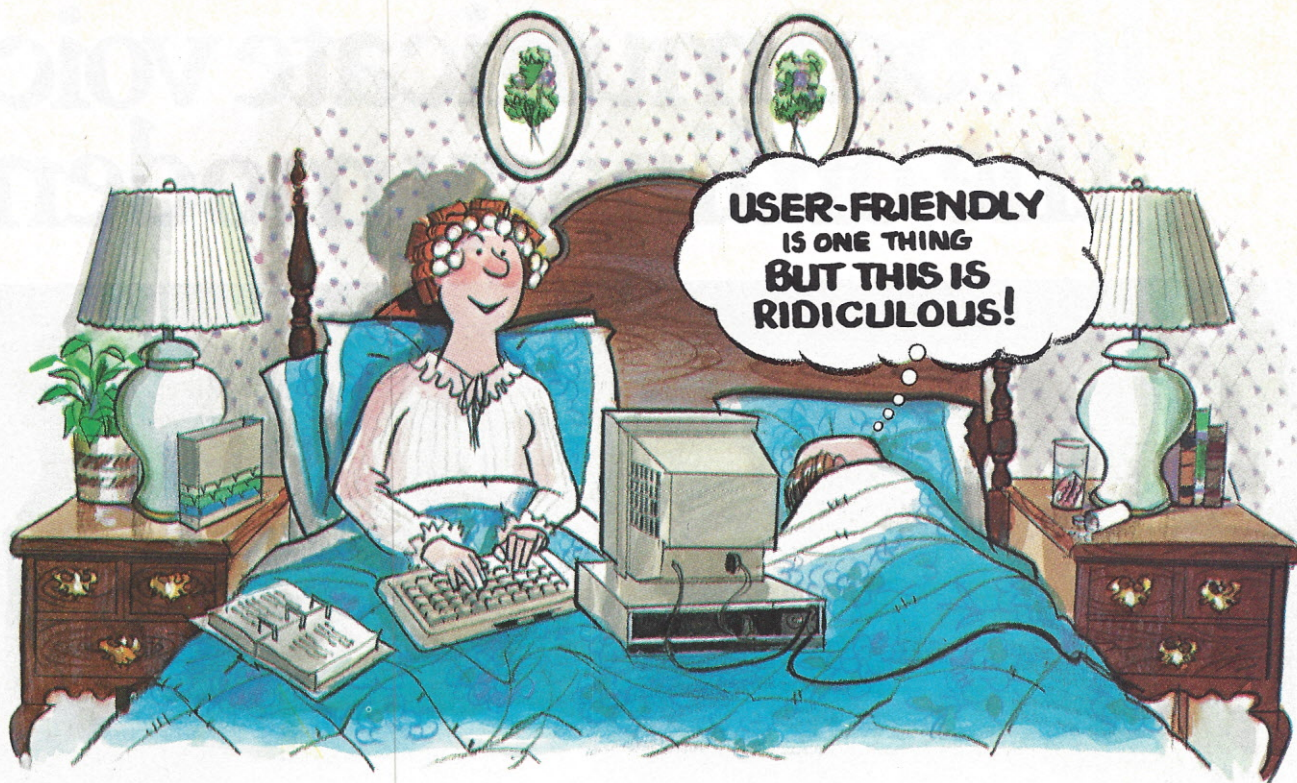
5. Find A System That "Fits" You. "Test drive" different systems to consid-

er ergonomic factors such as the size and feel of the keyboard, the look of the display screen, perhaps even the sound level of the fan inside the machine.

6. Look Ahead. Try to determine if your computing needs will increase in the future—and if, as a result, you will need a system that can be expanded easily.

7. Shop Around. Comparative shopping will eliminate the risk of overpaying for your system. But don't sacrifice performance or service for the sake of price. Visit as many dealers as possible and gather as many opinions and recommendations as your time allows. Don't jump at the first offering. Wait until consistent advice begins to emerge.

8. Set Up Service Support. Whether you choose to purchase a service contract or simply opt for the manufacturer's warranty, make sure you have workable options if your system breaks down. If possible, investigate the average "down time" of systems you are considering.



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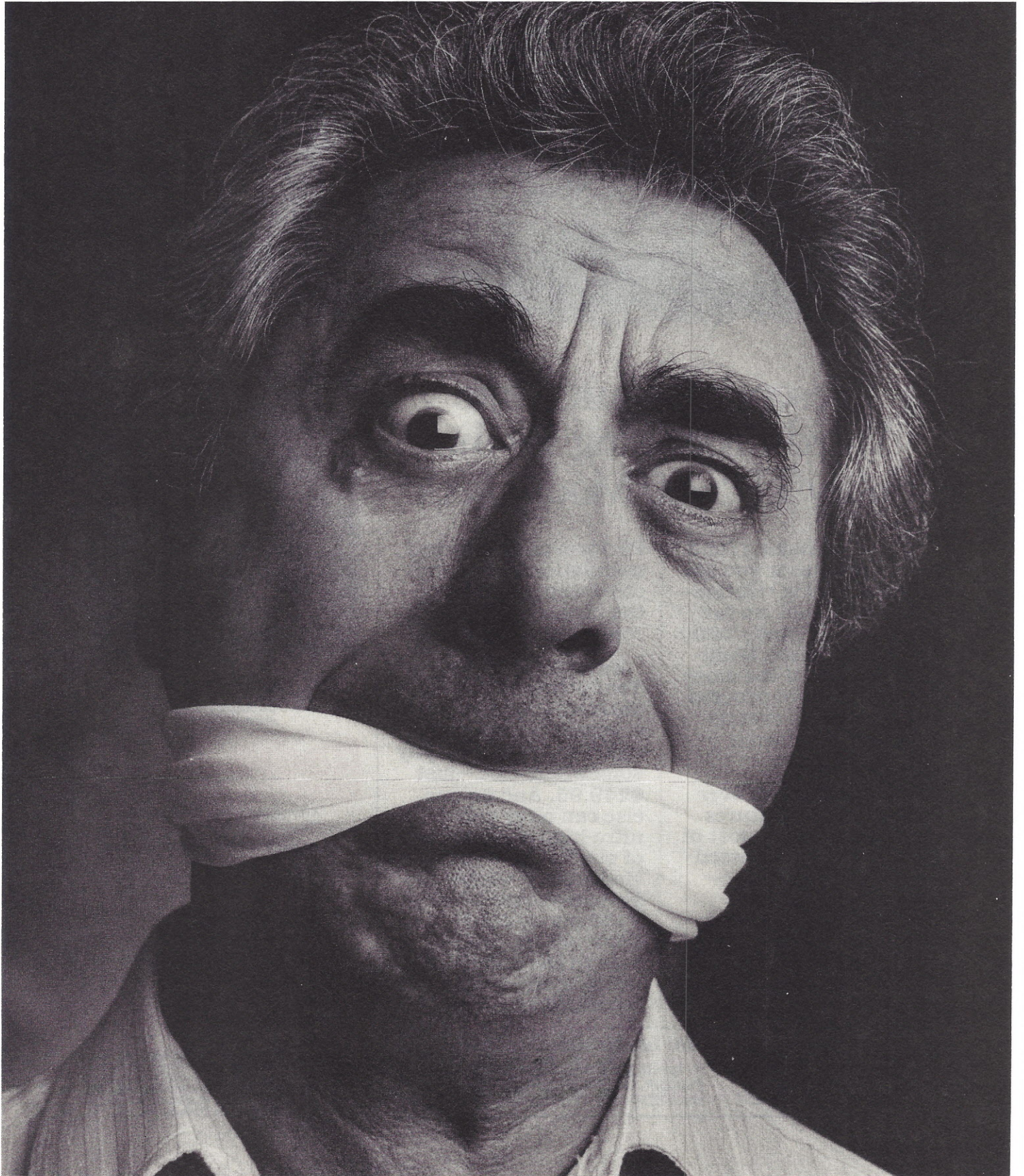


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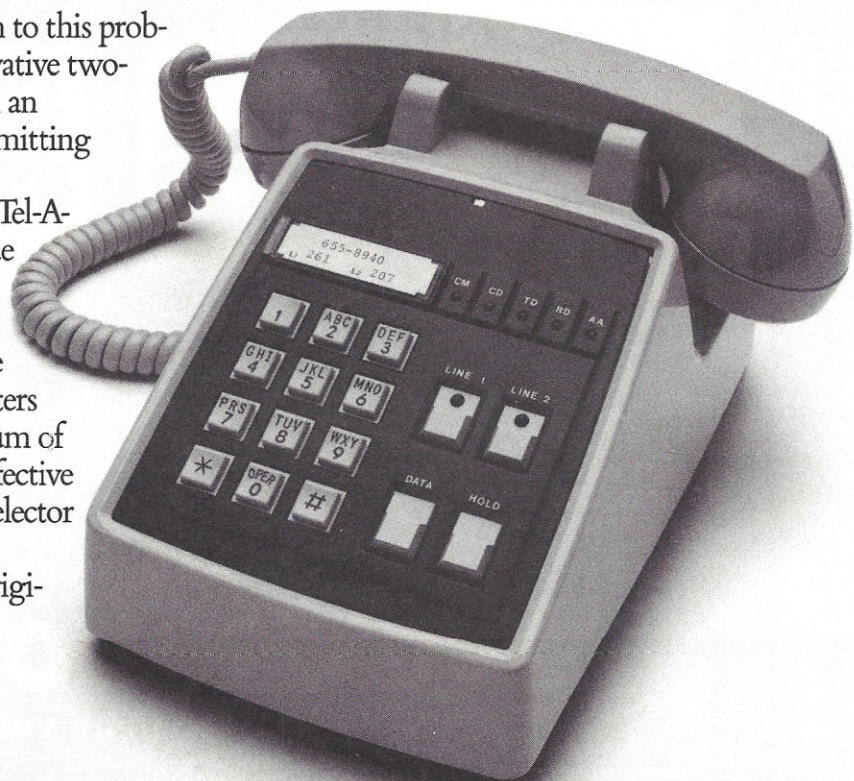
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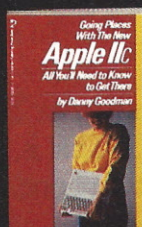
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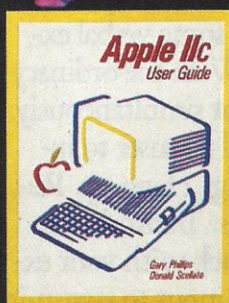


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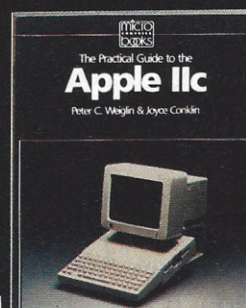
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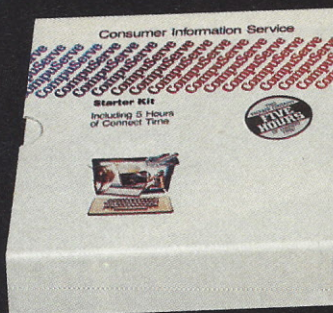
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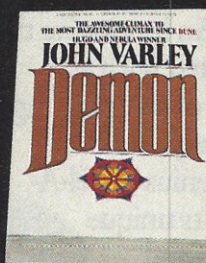
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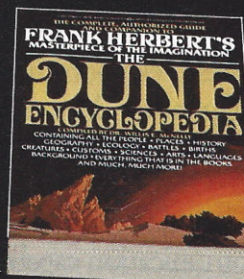
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CIRCLE 49

you want to store? How long are your written documents? Write the answers down so you'll have them with you when you actually go out to evaluate systems. Knowing about specific applications and levels of use can go a long way toward determining the kind of system you end up with.

If you have more than one application in mind, compile a list of quantitative needs for each application and then rank the applications in order of importance. You can get good software for just about any piece of computer hardware, but hardware that's excellent for graphics may be marginal for word processing. Your final decision on a system could well depend on which of several applications is the most important.

Once you've identified your immediate quantitative needs, you should think about qualitative considerations that can further narrow the selection process. How important is compatibility? Do you want to swap diskettes with other people or share the same data files? Are there "standard" software packages in your office that you need to use? Will you need to communicate with other computers, and if so, what kind? Are there other people who will use the system and do they have special needs? Are there particular physical needs, such as portability, to consider? These criteria are secondary and will seem terribly unimportant if you don't satisfy your qualitative requirements first. A prioritized list of your specific needs will pay off when it comes time to make compromises in the purchase of an actual system. Rest assured that there will be compromises.

Getting help

Some people will enjoy all that there is to learn before buying a computer. They get interested in the technology for its own sake and want to know enough about various products to choose for themselves. But many others see this process as a waste of time.

They're interested in a solution and while they're willing to devote the time to learn how to use the solution, they're not particularly interested in how the solution is determined. It often becomes a matter of either learning enough to make your own recommendations or trusting somebody else enough to rely on theirs. Each approach has its advantages and disadvantages. David Ferris is chairman of Ferrin Corp., a personal computer support firm in San Francisco. He says a third-party perspective is very helpful, because an outsider will

***"Most people basically
'buy' a salesperson.
People who do research
are the exception."***

often consider problems or needs that the purchaser might overlook completely.

"One thing people often don't adequately consider is the importance of getting help when they're learning a system," Ferris says. "A person will go out and buy the latest or most powerful system or software package and then be the only one in the office using it. New users are far better off sticking with a system other people in the office are familiar with, even if it isn't as powerful or advanced. The lower functionality of the system will be more than offset by the availability of quick help."

Ferris' company recommends that buyers try to think about a computer purchase as a two-year commitment. "We tell people to figure out their total expenditures for equipment and training and their anticipated growth needs for two years, and then divide the total in half to determine what they should spend in a year. We think you should be able to write off a com-

puter investment in two years, because the technology changes so quickly that it makes sense to upgrade that frequently.

At best, a consultant can almost eliminate the need for any detailed research on your own. The consultant can act as a primary screen for equipment, and can then explain the benefits of particular solutions without wasting too much of your time on products you won't end up buying. But while you can get instant expertise and the benefit of a broad, long-range perspective from the "right" consultant, the "wrong" consultant can lead you astray. "Many consultants are programmers," Ferris says. "They have a detailed but limited sphere of knowledge. Whomever you buy from, make sure they'll be around for training or technical support afterward."

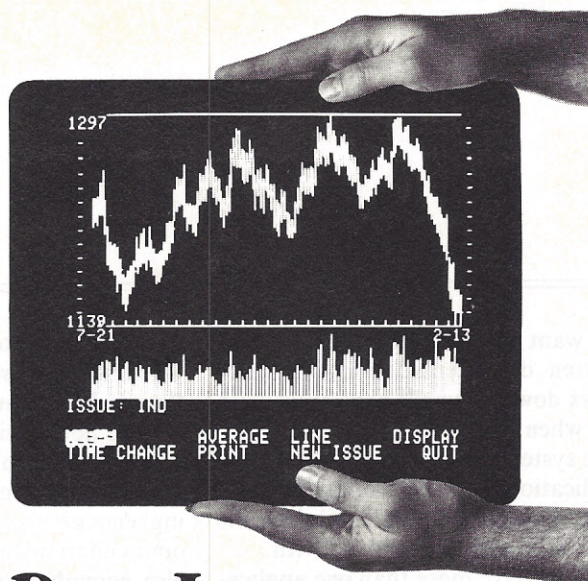
By far the most popular source of buying assistance is the retail store. Here you take the dangerous chance that a salesperson won't have a broad enough knowledge of products to recommend the ones that are best for you. On the other hand, you have the benefit of beginning a potentially long-term relationship. According to Chuck Kinch, vice-president of products for ComputerLand, "Most people buy a computer basically because they 'buy' the salesperson. The people who do a lot of research are the exception to the rule. Most people make a decision based on trust. Unless you're an unusual person and really go through the extensive drill of determining your options and evaluating the various trade-offs, what you need to do is to hook up with an expert. You'll need one before you buy and you'll need help afterward."

Buyers who opt for the advice of retail "experts" are those that see computers as just another consumer product. They don't expect to learn the inner workings of a refrigerator when they buy one. Similarly, they don't expect to have to know a lot

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about computers to buy one. The problem with this thinking is deeply based: A computer simply is not comparable to a refrigerator. Any refrigerator you're likely to buy will do the job about as well as another. With a computer, learning time is a given and there are a variety of potential computer solutions available to fit your particular needs. If you put your trust in the wrong expert, you could wind up with the wrong system.

So how do you know which expert to trust? "It's the same process you go through when you buy a car," Kinch points out. "If you visit enough stores, you figure out who's being straightforward with you and who isn't. You want to find a place you're comfortable with and where you know you can go back in and get service or support when you want it." This seems like sound advice, but the nagging question remains: How do you learn enough to know when one person is being straight with you and another isn't? If you don't know how a software package works, how can you tell whether an answer to a specific question is the right one or just a guess? Unless you've done a lot of research (in which case you may know as much about certain products as the salespeople do), you'll have to validate any answers you get. If one salesperson recommends one system and another recommends something totally opposite, get a third or fourth opinion. Keep asking questions and soon the consistent answers—and the knowledgeable salespeople—will stand out.

Into the breach

Armed with a list of needs and priorities, you can confidently go out into the world for a look at the goods and the people selling them. Visit as many computer stores as you can. As you focused on your needs before, try to focus on defining the hardware and software that meets them now. It's at this point—with the groundwork firmly laid—that you should progress

from a general examination of computing to a specific investigation of available products.

If you want to manage a large data base, for example, you'll first get general advice about the capabilities of the software you'll need for the job. More powerful programs generally require more RAM, and since the amount of RAM is a key feature in any computer system, you can use that requirement to narrow your field of options. If you want to store a lot of records and access them conveniently, you may be advised to get a hard

***Keep asking questions.
The consistent
answers will begin
to stand out.***

disk drive, or at least a computer system with high-capacity floppy disk drives. These, again, are major features of computers that will help you narrow your range of options.

Of course, one salesperson's solution to your needs could vary greatly from another's, so it's important to keep restating your general needs until a fairly consistent picture of the general solution—the amount of RAM you need or the kind of processor or disk drives, for example—is apparent. Don't take the first salesperson's specific recommendations. Ask a lot of people, and expect a lot of different answers. Make notes of hardware configurations mentioned frequently, specific brands or commonly mentioned software. You'll find that one question leads to several more. A question about display monitors might lead to questions about interface boards or software. Ask away. Get as much literature about the products mentioned as you can, particularly if it includes specifica-

tions about the levels of performance that you can match against your needs assessments.

Take copious notes, both about the specific solutions to your needs and the quality—or lack of it—of the stores or salespeople you visit. Your attentiveness will steer you in the general direction of the solutions you need and it will help you decide which store or adviser to seek out further in the future. After a few days of such active shopping, you should have a fairly good idea of what you want from a system. You should have narrowed the hardware and software lists to fewer than five final choices. At this point, your first move is to try eliminating a few choices with your list of secondary needs. If you insist upon compatibility with other computers owned by friends or colleagues, toss out the incompatible systems. If you don't need a portable system, stick with the desktop offerings. If you want to share data between software, make sure the programs will work together. If expandability is important, rule out the closed systems. This is also the right time to get advice from friends, coworkers and salespeople who made a good impression on you. Ask about the merits of one system over another. Ask about the manufacturer's reputation, how long they've been doing business, how the reliability of one product compares with that of another.

Before you revisit the stores you liked, make notes of your general impressions about systems that make it to your final stage of selection. If you liked a system that was offered by an unhelpful store, seek it out at a different store. When it comes time to spend some time with the systems that remain on your list of potential purchases, do so, if you can, with some real applications work. "It can be pretty hard to find the bad things about a product just from test-driving it in the store," Kinch says. "With software particularly, you may not

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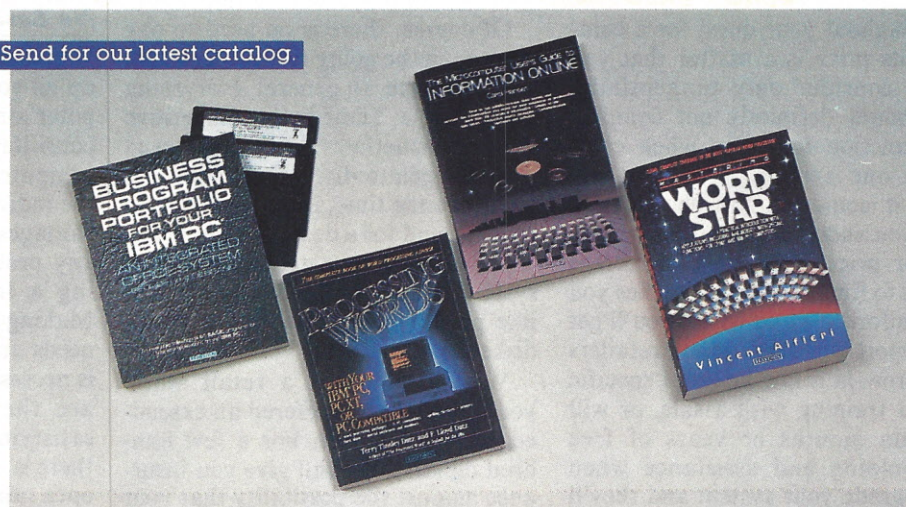
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find out what you don't like for months." With hardware, though, you can at least ask some questions that will result in useful impressions about the product's quality and ease of use. Is the keyboard to your liking? Are the disk drives particularly noisy? Do the seams on the case fit together well or does the unit look like it has been thrown together? Do the instruction manuals look well-organized and complete?

Taking the plunge

When you've made a decision about the system you want, be sure to buy it at the right place. Friendly, knowledgeable salespeople are fine when you are researching and shopping. But when it comes time to buy, there are some other critically important services that a retail store can and should provide. The store should be willing to set up the system, in your presence and spend a couple of hours showing you the basics of its operation. The store should have its own service department, so you don't have to send the system across town if you have problems. Service departments are also a good indication of a higher overall level of expertise in a store, because the salespeople learn from the technicians.

Throughout your quest for a computer, its price is a matter that you should consider only tangentially. You should definitely not compromise function for price when comparing one system with another. When it comes to the choice of a store, you shouldn't compromise service for price. The most important thing is to find a store that makes you feel comfortable and where you'll get the support you need. Many retailers now throw in a few hours of specific product training with a sale, or will give you months or years of free hand-holding and assistance when you upgrade your system and they'll already be familiar with your needs.

Certainly, there is always a temp-

tation to save money by buying through the mail or from a stripped down, cash-and-carry discount house. This isn't a bad way to go if you're an experienced user and you know exactly what you want. But if you are new to computing, it's not worth the savings to give up the support. It is important for a novice to be able to get help when problems arise. If you buy from a retail store, you can go back and get a hands-on demonstration of things you don't understand. Don't let anyone convince you that such support is as effective over

A service department means more expert salesmen. They learn from the technicians.

the phone. Telephone support is virtually useless when your system doesn't seem to be working right. It could be difficult for a telephone support person to determine, without seeing it, whether the problem lies in your hardware, your software, or you.


Of course, there is no need to pay more than the going rate for a system out of naivete. In general, everything is negotiable. These hotly competitive days, it sometimes seems that even more is open to discussion. For those who have the time, it is a wise idea to shop around for a deal. The net result could amount to a reduction in the system price or the inclusion of extras like printer paper, ribbons or blank diskettes.

When buying at a retail store, you'll probably be offered an extended service contract. For a few hundred dollars, this will give you insurance against the possibility that your system will break down after the manufacturer's warranty expires—but before the extended warranty ex-

pires. A service contract is a good idea if your system is a portable and you travel a lot. Systems on the go take a fair share of hard knocks. If the system is for use in an industrial location where it will be subjected to a lot of dust, dirt or vibration, extended service probably is worth the expense. But computers are remarkably reliable devices. Major problems tend to show up during the first few hours of use. If you have a standard, desktop installation, you probably won't have to worry about breakdowns.

A generally safe way to save money is to buy through a corporate purchasing department. Many large businesses buy personal computers in volume and thus get better prices. If you work at such a company, these savings are probably available to you without strings. Some suppliers to corporate purchasers provide on-site service and support. If on-site support or training are important to you, you should also consider buying from a systems house, which is a company that configures specific systems for large buyers and then provides a lot of after-sale service and support, often well beyond the manufacturer's warranty period.

No Losers

Whether you spend months reading up on your own, weeks visiting computer stores or hours talking with a consultant, it's difficult to blow a computer purchase completely. For the individual computer user, the advantages of computing will outweigh any problems encountered from using a less-than-optimum system. Making an honest assessment of your needs and spending as much time as is necessary to find a tailor-fit system are the safest ways to ensure a satisfying computer purchase. But there is actually only one requisite: an open mind and a willingness to learn. For people with these qualities there may well be no such thing as a bad computer. 

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Word Processing For Printers: Finding The Right Fit

Sophisticated print presentation requires
a careful combination of printer hardware
and word processing software

by Arielle Emmett, Contributing Editor

The paperless office is still a long way off. In most businesses, the need for printed copy remains, and, in fact, the computer's capabilities have made good print presentation even more significant. After all, an incisive report created with a powerful word processing package, an attractive chart generated with graphics software or an informative spreadsheet born of weeks of input all have severely limited utility if they can only be seen on a computer monitor.

Thus, a printer could be the most important peripheral you'll buy. In this Buyer's Guide, we deal with the full range of printing systems: First, we look at choosing software to run sophisticated printers now available. Then we offer a guide to dot-matrix and letter-quality printers by charting products, major features and manufacturer listings. The package provides a complete overview of printers to help you make that important buying decision.

Choosing a word processing package to support a full-featured printer is like negotiating a partnership. How well does the software address or enhance the full capability of the printer? How easy is it to change type fonts, arrange proportional spacing, format columns and print partial documents or link files? Can the printer carry out all the com-

mands available in the word processing software? Which features in each must take precedence and which can be subordinated to maintain the link between the two?

Obviously, high-cost, sophisticated printers aren't made for compromise. Whether they are based on laser, ink-jet or daisywheel technologies, they demand a full-featured word processor that can handle the gamut of formatting and printing functions. By the same token, full-featured word processors aren't meant to work with less sophisticated printers. They, in turn, require a machine to support all the things they can do—from micro-justification and phantom spacing to running headers and footers, soft and hard hyphens, variable character sets (including characters for foreign and technical/scientific languages) and changes in character pitch, line height and line spacing.

How can consumers find the right fit between software and the printer they desire? The answers aren't simple. "Very few (stand-alone) word processing packages try to address the more capable printers," says George Alexander, an associate editor for Seybold Publications, Inc. (Media, Pa.), the word processing industry's watchdog. Esther Dyson, a Manhattan-based computer consultant and publisher of *RELease 1.0*, a widely-circulated industry publication, concurs: "Obviously the stand-

alone word processor is losing the race; prices are coming down. Acceptable standards for business documents are changing. Twenty years ago, typewriting was acceptable. Now word processing (standards) are changing to include organizational diagrams—not just bar charts—but organizational charts, fancy fonts, proportional spacing, heavy and interesting use of graphics. Typewriting and underlining won't cut it anymore."

Keeping pace

Industry consultants and manufacturers are worried that most software manufacturers have not kept pace with the developments of the laser printing industry. Currently there's an absence of reasonably priced word processing software configured for these printers, according to several experts. "None of the garden variety word processors can handle the most sophisticated printing functions, with the exception of Microsoft Word (for the IBM Personal Computer), which has been designed for the more flexible laser printers," says Alexander. Adds Edward Savarese, president of Personal Computer Products (PCP), a San Diego firm now producing a laser printer interface for personal computers: "If you've used a particular software package on a printer, it may not run on a new printer. That's the issue. A lot of people don't realize



Sculpture by Ajin. Calligraphy by Ina Saltz. Photographed by Roberto Brosam

this when they buy the new high-speed laser printers. They think it's terrific. But if someone hasn't taken care of software to drive the printer, they may be in trouble."

PCP is among those firms working on solutions to the problem. They've developed—for OEMs (Original Equipment Manufacturers) and major manufacturers—a "daisy-wheel emulation software package," which is combined with a hardware controller to allow conventional word processors like WordStar to talk to the new laser printers, among them the comparatively low-cost Canon laser printers. The idea, Savarese explains, is to "plug in our card with a laser printer and drive it as though it were a Diablo Model 630" daisy-wheel correspondence-quality printer. Speed and dot resolution however, will be much higher thanks to the new printer's laser scanning technology.

The PCP system is costly, running between \$3500 and \$5000, depending on which features are sold in the package. Some will come bundled with a Canon laser printer. (Other manufacturers may choose to sell the system with their own printer.) "When we designed a printer interface, we made it very intelligent so it could provide forms and multiple fonts as well as daisywheel emulation. Our controller can go from eight to 28 pages a minute. It can drive the Xerox laser printer. We've done a parallel mode and serial mode (interface)," says Savarese. "A lot of character printers are serial printers (like the NEC Spinwriter). You can drive them by entering the proper coded sequences for boldfacing, underlining and striking. But when those escape codes go to a new printer, and the printer doesn't recognize them, it won't work. There are too many unknowns from the software point of view." Savarese believes the daisy-wheel emulation concept should provide "a standard way of interfacing to software packages that will be on the

market, without requiring internal changes in the word processing or other applications software."

Sophisticated links

Other companies are developing strategies to link word processing to high-speed printers. Many of them are high-cost. A Cambridge, Mass., company, Interleaf, Inc., is selling a \$53,000 turnkey Office Publishing System (OPS), including computer (based on the Sun Microsystem personal workstation), software, control-

Other companies are developing strategies to link word processing to high-speed printers.

ler and printer (a Canon LBP-CX), that does resolution-independent word processing and graphics integration on the computer screen. According to George Potter, vice-president of marketing: "It is a very powerful multiple font text processor, formatter and paginator that is tightly integrated with a data-driven business graphics capability and a diagramming capability." The system allows a user to electronically format pictures and text using two families of type fonts—from six to 36 point—on an 8½" by 11" on-screen "page," which will output to a laser printer or typesetting machine at its maximum resolution. (Thus the term resolution-independent.) An important feature of the system is that ASCII text can be written and edited on an IBM Personal Computer or Wang word processor (using a conventional software package like WordStar), then "flagged"—through a bracket and title system—according to its separate components and then sent to

the OPS workstation for automatic formatting—each separate component of the document (e.g., titles, subheads, etc.) is formatted according to "properties"—fonts, indentation, etc., defined by the user.

Another system, developed by Xerox Corp., employs a networking architecture and communications protocols to link word processing with Xerox's line of laser printers. The protocols, known as InterPress communications protocols, are designed to reach out through an Ethernet system. They define a "document format standard for high-quality laser print servers," according to John Shoch, president of Xerox's office systems division in Palo Alto, California. Servers are like spoolers: They are combination hardware/software devices which handle laser print traffic from multiple computers, storing documents on a separate disk and then printing out multiple copies on a single laser printer when traffic has cleared.

"The protocols define the representation of a document, including mixed graphics and text," Shoch says. They are combined, in a three-tiered architecture, with Ethernet and Xerox Network Systems (XNS) protocols. The architecture is incorporated within some 20 different Xerox products that connect to Ethernet, including six workstations and four or five different printers that can accept an InterPress document. Currently the InterPress protocols are being licensed and sold to independent software manufacturers.

"What you find, typically, is that our 2700 laser printer acts like a daisywheel printer. But in order to take advantage of the laser printer, you have to create something at the other end (in software) that can make more complex printer graphics, both faster and of higher quality," Shoch says. Xerox's 8010 computer, for example, uses icons and a mouse to combine graphics and text displays in an on-screen 8" by 11" page, so that an

operator can see exactly how a document will be formatted in laser print printed copy before it's sent out. That's "what you see is what you get" formatting philosophy. Xerox's personal computers—the 820-II and 16/8—can also generate an InterPress master and send it directly to a server for printing (a server costs \$12,000, incidentally). WordStar will run on these personal computers with some conversion routines, Shoch says. And any word processor that can generate ASCII or WordStar-compatible files can also take advantage of the technology. "A year ago we announced a joint effort with the software producers, 3-Com and VisiCorp, to integrate the IBM Personal Computer and compatibles into the Xerox networking environment," Shoch says. The upshot of such an agreement will be that an IBM Personal Computer—and word processing software it runs—will be able to take advantage of the established Xerox laser printing formats and network servicing protocols.

Alternatives

Not every manufacturer, much less consumer, will invest in these kind of technologies, however. Hewlett-Packard, producer of the brand new HP LaserJet 2686 laser printer for under \$3500, has adopted a different strategy, distributing its printer to stand-alone word processing manufacturers for examination. The companies, in conjunction with HP, will determine in what ways their software can (or cannot) be configured to drive the LaserJet printer. Thus far, according to Rob Heyde, a technical support engineer with Hewlett-Packard, packages like WordStar, WordPerfect for the IBM Personal Computer, VolksWriter Deluxe and PFS:Write, in addition to MemoMaker (a memo writing or short report package for the HP 150) and Picture Perfect, can exploit some, but not all, of the LaserJet print features, which include a 300 dot per inch res-

olution, text and integrated graphics, and a full line of variable character, line and proportional print features.

By contrast, Microsoft Word (for the IBM Personal Computer) is equipped at present to take full advantage of LaserJet's capabilities, according to Greg Slyngstad, a Word program manager. The software drives the LaserJet printer through a specially configured printer driver option called AUX1 Printer, according to Slyngstad.

"We're really excited about it. This

Word can take advantage of LaserJet's capabilities with a special drive option.

is the first low-end laser printer that will produce near-typeset quality in a variety of font sizes and styles," he says. Word's complex formatting output exploits not only LaserJet but other letter-quality printers as well, including the NEC Spinwriter family, Diablo Model 630, Qume Spring 11 Plus and C. Itoh Starwriter Model FP. The software activates as many as 64 generic fonts—a characteristic print type of a specific size, character width and style, and does justified text (aligned text in both right- and left-hand margins) and proportional spacing—a term referring to the compression or expansion of individual printed characters to fit a certain space. Formatting options in Word are carried out in two ways. First, a user can either directly insert page layout, indents, footnoting and font change commands in his document during the Edit process. Second, he can access a separate option in the program (through the "Gallery" menu) enabling him to specify a "style

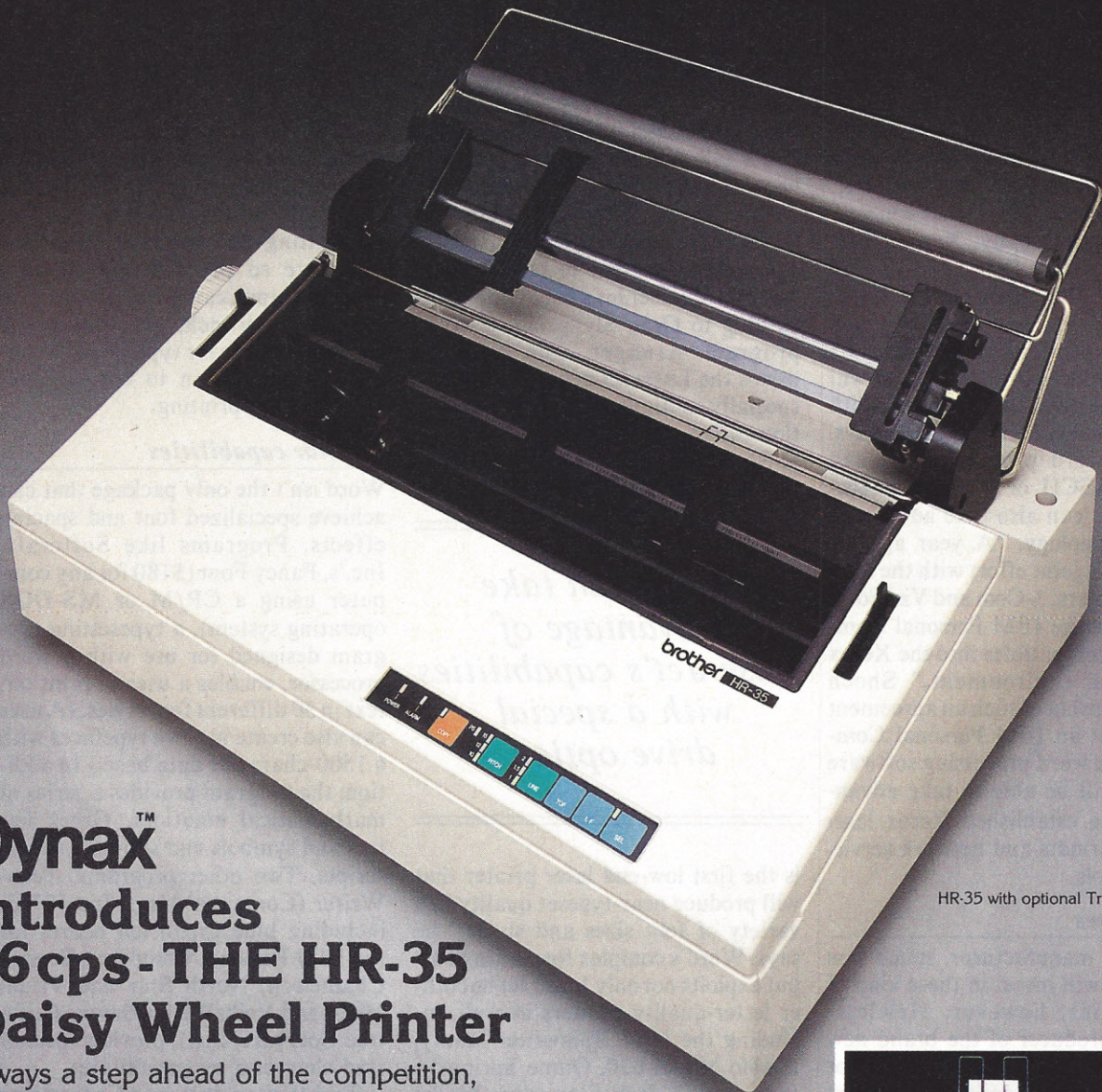
sheet": a customized set of formatting commands that can be "attached," electronically, using a three keystroke command, to any document on file. Formatting and printing specifications are so precise that Word's printed output can be resolved up to 1/1000 of an inch, which makes it entirely suitable for typesetting applications in addition to conventional letter-quality printing.

Similar capabilities

Word isn't the only package that can achieve specialized font and spacing effects. Programs like Softcraft, Inc.'s, Fancy Font (\$180 for any computer using a CP/M or MS-DOS operating system), a typesetting program designed for use with a word processor, enables a user to print out text in 30 different font styles. (A user can also create his own typefaces with a 1500-character data base.) In addition, the program provides a series of mathematical notations, Greek letters and symbols and sub- and superscripts. Two other programs, TechWriter (Computer Mart, Inc., \$795, including blue expansion board, for the IBM Personal Computer, Seequa Chameleon, North Star and Visual 1050) and VolksWriter Deluxe (Life-tree Software, Inc.), provide specialized character set capabilities.

TechWriter does word processing with mathematical notations, including integral signs and some other 200 characters and symbols. (A user can even specify the printed size of the integral.) VolksWriter Deluxe does multilingual and scientific applications. It can write text in German, French, English, Spanish and Italian. The specialized characters are accessible in the program by pressing the IBM Alt key and 0-9 and A-Z keys. Deluxe also comes with instructions to configure the software to European daisywheel and thimble printers. It may be necessary to construct ASCII translations tables in order to get the IBM to talk to these specialized printers. Another alternative in Deluxe is

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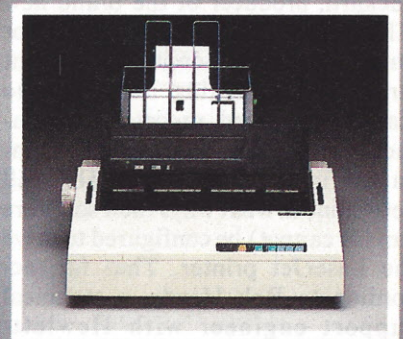
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Sunnyvale, CA 94086
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to customize one's own set of specialized print symbols and characters, storing them on a file that can be loaded each time the character set is used.

Potential traps

Whether or not a program offers specialized capabilities or character sets, it's essential to find out first if an available printer will support them. Another problem to sort out is just *how* the printer supports them. According to Microsoft's Slynstad, some programs (and printers) demand that certain specialized formatting be done on an operating system level, rather than in the processor itself. This can slow down the entire text management process.

"A lot of word processors have to use escape codes in order to change type fonts, so printing is not controlled by the processor," Slynstad says. The thing that people should look for is a program that takes advantage of the printer and font size without requiring the user to learn printer codes. That just messes up the screen."

Word processors that are ill-equipped to handle changes in font on their own may also be incapable of reformatting enlarged fonts Slynstad and others warn. "You may have to manually reset the lines" on the screen, Slynstad says, "and count the number of characters per line." Adds Seybold's Alexander: "The key to finding a package is that you want to preview how the lines will break and how columns will break. You should be able to see how many characters and words will be on each line" before the output is printed.

Guidelines

Both Slynstad and Alexander have developed definite guidelines for choosing processors. Slynstad believes as much printer control as possible should be in the processor itself. Alexander judges a processor by its flexibility. "The more flexible the bet-

ter," he says. Packages—at least for individuals who demand more complex printing for business applications—should support a wide variety of fonts, character sizes, fancy formatting, ruled boxes, proportional spacing and "kerning"—a typesetting term which refers to the ability to *overlap* the endpoints of certain characters so that they are esthetically aligned. "This is characteristic of typesetting software," he says. "But in word processing, it's quite rare."

Still, Alexander believes most word processors will have to catch up to the

"The key to a package is that you want to preview how the lines and columns will break."

more flexible printers. Sooner or later, users will want packages that accommodate a "wide variety of typographic niceties," he says, including easy tabular alignment, dropped initial caps and the ability to insert bullets. Other features like on-screen formatting (the "what you see is what you get" capability) and the ability to integrate text and graphics—a capability now available in programs like MacPaint and MacWrite—will also grow in popularity. And many users will be turning to high-powered typesetting software if word processors do not immediately accommodate their needs.

At present, though, word processors still do yeoman's work for the majority of people who use them. Programs like WordStar, for example, (which does not offer such typographic niceties as proportional spacing), offer "chained" printing, which allows the processor to print out a series of files consecutively, and "nested" printing, in which files printed con-

secutively contain embedded instructions allowing the printer to access other files. Another word processing utility (not endemic to WordStar) is "spooler" printing, a feature enabling multiple users to share a printer. In a spooler system, which is controlled through the operating system, word processing files are first directed to a "spool file" until the printer has time to handle them. This feature enables concurrent editing and printing, which is important when a business user wants to get back into his document and keep writing while the printer does its work.

Added features

Other powerful format and page layout features that are much sought after these days are: incremental line spacing and "forced pages," which allow the user to design the document; embedded printer controls (such as the "dot" commands in Hayden's PIE:Writer and MicroPro's WordStar); windowing capability (as exemplified in Microsoft Word, which offers as many as nine windows in which to write, edit and format text); and the so-called "non-break," "phantom space" and "phantom character" commands. These are textual conveniences in a processor which are often used in technical and scientific notation, explains Kathie Krohn, a training manager with Raish Enterprises (Levittown, N.Y.), a systems and software house offering customized word processing systems.

According to Krohn, the non-break space prevents the processor from breaking a technical term at the end of a line (e.g., 78 kg.). A similar oddity, the "phantom character," allows a user to activate special characters available on the printer wheel (e.g., a daisywheel). "Phantom characters have different functions depending on the printer you're using," Krohn says. "The only way to activate them is through the phantom character on the processor." Once activated, these can take advantage of unusual signs or

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symbols on the wheel—say, for foreign languages or scientific notation. (WordStar and several other output-oriented packages offer phantom characters.)

Krohn does not believe that other touted features in word processing deserve as much attention as they're getting. She asserts that proportional spacing is overrated. "It's not that much of a problem. One of our clients insisted on proportional spacing, but he found the packages that had it were lacking in other important features," Krohn says. "It's not that important. If you have microjustification—the ability to evenly distribute white space on a line—and the proper font, you can't tell."

Not everyone shares Krohn's views. Consultants we spoke with repeatedly mentioned proportional spacing as a must for the new word processors. Likewise the ability to turn margin justification on and off, so that users could do numerical column alignment. Another "must" was integral graphics functions. MacWrite, MacPaint and the Lisa architecture accommodate integral graphics on a low-resolution level (as of this writing, Mac's only printer is the ImageWriter, a dot-matrix printer). For high-resolution, though, users may turn to packages like Compugraphic's Personal Composition System, for the Lisa personal computer, which can accept ordinary word processing and graphics files and print them out at 1000 dots per inch on typesetting equipment. Says Alexander: "These packages embody the types of cap-word processing packages will have once the more flexible printers become available."

Until they do, though, buyers of word processing packages will need to develop their own checklist of desired features. Which software will support the best printers? Which printers will work with the hot new software packages? Both questions should be answered before a buyer makes the investment.

What To Look For In A Printer

Type quality, printer speed and price are points to consider when choosing a dot-matrix or letter-quality printer

In the preceding article, we looked at printing from the software perspective—features to look for when choosing a word processing package to drive a printer. Now, the question is: What do you look for in a printer? This Buyer's Guide and the accompanying tables provide an overview of dot-matrix and letter-quality printers, the two most common and, generally, most affordable types of printers on the market.

Although there are several factors to consider when choosing a printer, your main concern will be the appearance of the finished product, or printout. The quality of printout produced by dot-matrix and letter-quality printers varies widely, due to the different technologies used in the printing process. The characters printed by a dot-matrix printer are formed by a set of tiny metal rods contained in the print head. The printer, acting on signals received from the computer, extends the rods needed to form a specific character. Those rods strike the printer ribbon, leaving the impression of the character on the paper. The most common dot arrangement, or matrix, is eight by eight, although some printers have matrices of a higher density. The higher the density, the closer the dots and the sharper the printout will appear.

Even at high densities, text printed on dot-matrix printers retains the high tech look which has come to be associated with computer printouts.

In many offices, dot-matrix printers may be sufficient, at least for internal work. But if you need typewriter-quality printouts for formal reports and letters destined to clients and outside contacts, a letter-quality printer might be the best bet.

Letter-quality printers use daisy-wheel or thimble mechanisms which devote one spoke to each character in the printer's character set. When the printer receives a print command from the computer, it selects the specific spoke and causes it to strike against the ribbon. The printout is sharper than that of a dot-matrix printer because the characters are already fully formed when they hit the page.

Based on printout quality alone, letter-quality would seem the way to go. But it's not that easy. There are many other factors to think about, factors which really come down to trade-offs between dot-matrix and letter-quality printers. You should for example consider whether you'll need printouts of charts and graphs. Dot-matrix printers can produce graphic printouts, but letter-quality printers are limited to text printing, although some of the more sophisticated letter-quality units are beginning to offer limited graphics capabilities.

One of the greatest differences between dot-matrix and letter quality printers is printing speed. Dot-matrix printers are generally faster than their letter-quality counterparts be-

cause the movement required for a dot-matrix print head to print is minimal, while a daisywheel must rotate to the character to be printed, print, then rotate again to find the next character.

Printer speed is measured in characters per second (cps). A very slow letter-quality printer will produce about 20 cps, while one of the high-speed dot-matrix models can produce up to 200 cps. In fact, some dot-matrix printers can reach speeds of 600 characters, while the upper limits of letter-quality units is around 250 cps. While the difference may not seem important if your printing is limited to two or three letters a day, a fast printer can be a necessity when

you need to produce hundreds, even dozens, of pages in a day.

Noise

A printer may be the most frequently used peripheral in your computer setup. It can also be the noisiest. Printer noise is measured in decibels (Db), and while even the most vociferous unit won't rattle the windows, many printers are loud enough to make telephone conversation nearly impossible for anyone sitting within close range. The situation is of course aggravated by long periods of printing time, especially on the slower letter-quality printers. And as luck would not have it, the letter-quality printers tend to be the noisiest of the

lot, with an average decibel level of 65. The noise is due to the weight of the print head and the force of its impact against the paper.

One way around the printer noise problem is to use a noise reduction hood—a hinged plastic cover which fits over the printer and muffles the noise. Another solution is to place the printer in a remote location—in a room of its own, for example—away from the areas where people work. Either way, there are trade-offs—the hood adds to the cost of the printer, while the remote printing setup has the potential for inconvenience.

Dot-matrix printers, with their light printing heads and relatively gentle impact, are generally quieter

High-End Laser And Ink-Jet Printers Offer Speed And Quality

Although the affordability of dot-matrix and daisywheel printers has made them the preferred choice of personal computer users, they are by no means the only printers on the market. There are a variety of products now becoming available which use sophisticated ink-jet and laser technology to produce quality printouts.

Ink-jet printers, as the name implies, form characters on the page by shooting jets of ink from nozzles contained in the print head. Laser printers use a laser beam to trace characters onto a light-sensitive drum, which attracts toner and applies it to the page in the form of characters outlined by the laser. Neither process involves direct contact of the print head with the paper and as such both fall into the category of "non-impact" printing. This in contrast with "impact" printers such as dot-matrix and daisywheel units which rely on the impact of print head and paper to produce an image.

Non-impact printers have an edge over dot-matrix and daisywheel units in several areas. Print quality is generally higher. Although ink-jet and laser printers use the same dot-matrix technique as impact dot-matrix printers, the dots are more densely grouped, making for a sharper image. Average ink-jet

resolution is 150 by 150 dots per inch; laser printers have a resolution of 300 by 300 dots—both considerably higher than the 75 by 75 dots per inch of impact dot-matrix printers.

Ink-jet and laser printers are fast. The average daisywheel printer produces 55 to 60 characters per second (cps), and the typical dot-matrix speed is 250 cps, at considerably less than letter-quality. Laser printers can produce near-typeset quality printouts at better than 300 cps. Ink-jet printers run at about the same speed as a fast dot-matrix unit, but can produce letter-

quality text.

The absence of impact in the laser and ink-jet processes also makes these printers much quieter than impact printers. Ink-jet printers emit only a faint whisper as ink leaves the jet, while a laser printer makes no sound at all.

While the cost of these printers remains higher than dot-matrix or letter-quality units, advances in technology and increases in market demand are expected to bring down costs with the next few years, putting the advantages of ink-jet and laser technology in the grasp of the average consumer.

A BUYER'S GUIDE TO INK-JET PRINTER MANUFACTURERS

ANDERSON
JACOBSON, INC.
521 Charcot Ave.
San Jose, CA 95131
(408) 263-8520
Product: AJ650
Price: \$1495

COMPUTERS
INTERNATIONAL, INC.
3540 Wilshire Blvd.
Los Angeles, CA 90010
(213) 386-3111
Product: Daisywriter 2000
Price: \$1495

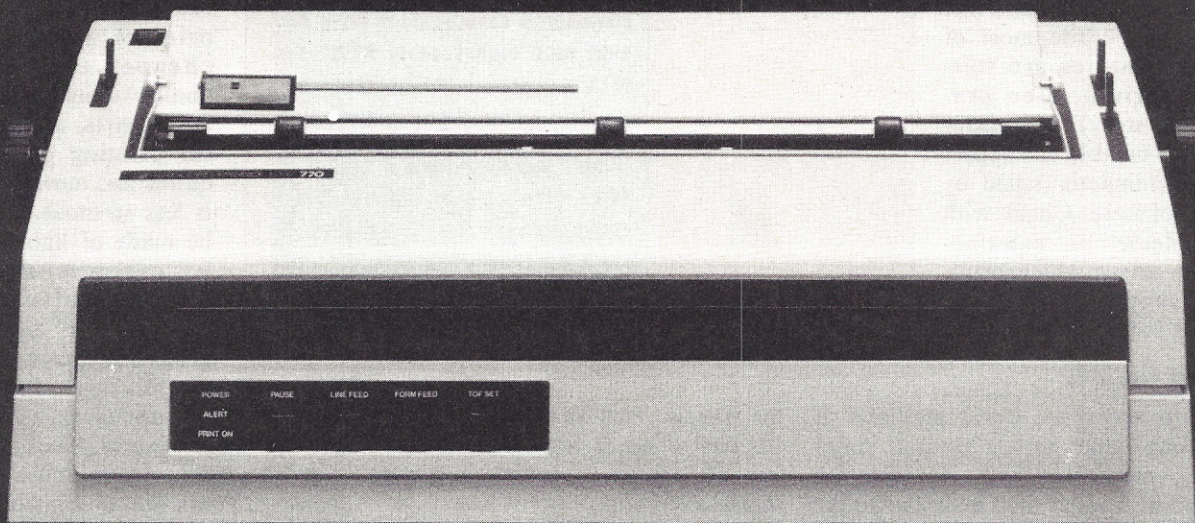
DIABLO
SYSTEMS, INC.
P. O. Box 5030
901 Page Ave.
Freemont, CA 94537
(415) 498-7000
Product: C150
Price: \$1295

PRINTACOLOR
6040 Northbelt Dr.
Norcross, GA 30071
(404) 448-2675
Product: TC 1040
Price: \$5495

QUADRAM CORP.
4355 International Blvd.
Norcross, GA 30093
(404) 923-6666
Product: Quadjet
Price: \$895

TANDY CORP/
RADIO SHACK
300 One Tandy Center
Fort Worth, TX 76102
(Call local store)
Product: CGP-220
Price: \$699

Would you buy an
electronic daisy wheel printer
that prints at a bi-directional
36 cps, has a standard 2K buffer
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superscript, bold typing, carrier
feed in units of 1/120 inch,
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than letter-quality units. They range between 55 and 60Db.

Special features

Many printers offer functions which go beyond the basic printing of text with upper- and lowercase characters and punctuation. These include the ability to print text in italic and boldface type, the ability to underline text, provisions for scientific and mathematical notations (i.e., Greek letters), sub- and superscripts, variable character sets (e.g., foreign languages). Some printers will support proportional spacing, condensed or double-width characters, changes in character pitch, line height and line spacing. While most of these features are software-driven, (see preceding story) the printer has to be able to support the commands issued by the software. Check with the dealer or manufacturer to see which printers support which features before you buy.

Feed Options

There are three basic methods of feeding paper into a printer: roller feed, tractor feed, and a combination of both. A roller feed is similar to the roller on a typewriter. You can use any type of paper, including letterhead, and change to different types of paper quickly, but, unless the printer is equipped with a sheet-feed mechanism, you have to insert each page separately.

Tractor-feed printers control the paper through holes in the left and right-hand margins of the paper that interlock with sprockets on the trac-

tor wheels. This method uses a continuous rolled or fanfolded sheet, so you don't have to insert each page separately.

A combination of the two methods offers the best of both worlds. Check the tables for paper feed options.

Interfaces

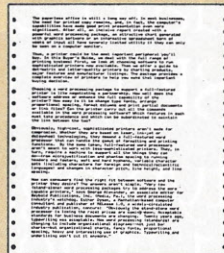
Printers generally come equipped with either a serial or a parallel interface, although a few have both. The interface card you buy for the computer must match the interface on the printer (i.e., serial to serial, parallel

to parallel). The tables accompanying this story indicate which printers use which interfaces.

Print heads have a finite lifespan, usually expressed by the manufacturer in terms of millions of characters. Dot-matrix print heads tend to last longer than daisywheel mechanisms, which are often made of plastic. For this reason, daisywheel replacement costs are listed in the letter-quality printer tables.

The bottom line

As with any choice of computer peripherals, there are trade-offs between price, quality and features. Dot-matrix printers are generally cheaper than letter-quality units. They have fewer parts, and because the printing process requires less movement and is less strenuous, they can be made of lighter (thus less expensive) materials. They are also faster, quieter and can print graphics. Letter-quality printers offer much high-



Some examples of enhanced printing. Text taken from page above was printed in (from top) regular, double width, double strike, condensed and italic modes.

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Mountain View, CA 94040
(415) 941-7914

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CO., INC.
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Cupertino, CA 95014
(408) 996-1010

AXIOM CORP.
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San Fernando, CA 91340

AXONIX CORP.
417 Wakara Way
Salt Lake City, UT 84108
(801) 582-9271

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(201) 981-0300

CANON
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(516) 488-6700

CARDCO, INC.
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Wichita, KS 67202
(316) 267-6525

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ELECTRONICS, INC.
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Los Angeles, CA 90066
(213) 306-6700

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3540 Wilshire Blvd.
Los Angeles, CA 90010
(213) 386-3111

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6200 Canoga Ave.
Woodland Hills, CA 91365
(213) 887-8000

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COMPUTER CORP.
4216 Stuart Andrew Blvd.
Charlotte, NC 28210
(800) 222-4528,
(704) 523-8500

DIABLO SYSTEMS, INC.
P.O. Box 5030
801 Page Ave.
Fremont, CA 94537
(415) 498-7000

DIGITAL
EQUIPMENT CORP.
2 Mount Royal Ave.
Marlboro, MA 01752
(617) 480-4000

DYNAX INC.
5698 Bandini Blvd.
Bell, CA 90201
(213) 260-7121

EPSON AMERICA, INC.
3415 Kashiwa St.
Torrance, CA 90505
(213) 533-8277

FACIT DATA PRODUCTS
235 Main Dunstable Rd.
Nashua, NH 03062
(603) 883-4157

FLORIDA DATA CORP.
600 D. John Rodes Blvd.
Melbourne, FL 32935
(305) 259-4700

FUJITSU AMERICA, INC.
3055 Orchard Rd.
San Jose, CA 95134
(408) 946-8777

GENICOM
GE Drive
Waynesboro, VA 22980
(703) 949-1000

HEWLETT-PACKARD
3000 Hanover St.
Palo Alto, CA 94304
(415) 857-1501

INFORUNNER
1621 Stanford St.
Santa Monica, CA 90404
(800) 824-3044,
(800) 421-2551 (in CA)

JUKI INDUSTRIES OF
AMERICA, INC.
299 Market St.
Saddle Brook, NJ 07662
(201) 368-3666

LEAR SIEGLER INC.
Data Products Div.
900 E. Ball Rd.
Anaheim, CA 92805
(714) 774-1010

MANNESMAN
TALLY CORP.
8301 South 180th St.
Kent, WA 98032
(206) 251-5500

MICRO
PERIPHERALS, INC.
4426 South Century Dr.
Salt Lake City, UT 84123
(800) 821-8848,
(801) 263-3081

NEC HOME ELECTRONICS,
INC.
Personal Computer Div.
1401 Estes Ave.
Elk Grove Village, IL 60007
(312) 228-5900

NEC INFORMATION
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1414 Massachusetts Ave.
Boxborough, MA 01719
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NORTH
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Hauppauge, NY 11788
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OKIDATA
532 Fellowship Rd.
Mt. Laurel, NJ 08054
(609) 235-2600

PANASONIC
INDUSTRIAL CO.
One Panasonic Way
Secaucus, NJ 07094
(201) 348-5200

PERSONAL MICRO
COMPUTERS
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Mountain View, CA 94043
(415) 962-0224

PHILIPS
PERIPHERALS, INC.
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Unit No. 12
South San Francisco,
CA 94080
(415) 952-3000

PRACTICAL AUTOMATION,
INC.
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Shelton, CT 06484
(203) 929-5381

PRIMAGES, INC.
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Bohemia, NY 11716
(516) 567-8200

PRINTEK
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Benton Harbor, MI 49022
(616) 925-3200

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(408) 942-4000

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SCM CORP.
Smith-Corona Group
65 Locust Ave.
New Canaan, CT 06840
(203) 972-1471

SILVER-REED
AMERICA, INC.
19600 S. Vermont Ave.
Torrance, CA 90502
(213) 516-7008

SOLTEC CORP.
11684 Pendleton St.
Sun Valley, CA 91352
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(800) 423-2344

STAR MICRONICS
200 Park Ave.
Suite 2309
New York, NY 10166
(212) 986-6770

SWINTEC CORP.
P. O. Box 421
23 Poplar St.
East Rutherford, NJ 07073
(201) 935-0115

TANDY CORP./
RADIO SHACK
1800 One Tandy Center
Fort Worth, TX 76102
(817) 390-3011

TEXAS INSTRUMENTS
P. O. Box 402430
Dept. DPF-00000
Dallas, TX 75240
(800) 527-3500

TOSHIBA
2441 Michele Dr.
Tustin, CA 92680
(714) 730-5000

TRANSTAR
P. O. Box C-96975
Bellevue, WA 98009
(206) 454-9250

TTX, INC.
3420 E. Third Ave.
Foster City, CA 94404
(415) 341-1300

BUYER'S GUIDE TO DOT-MATRIX PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|----------------------------------|--------------------|--------|------------------------|---|
| ADVANCED MATRIX TECHNOLOGY, INC. | AMT Office Printer | \$2995 | 18.25 × 25 | data=250, memo=100, letter=45 |
| ANADDEX, INC. | DP/9000B | \$1200 | 16.38 × 23.05 | 13.3 pitch=240, 12 pitch=216, 10 pitch=180 |
| ANADDEX, INC. | DP/9001B | \$1200 | 16.38 × 23.05 | 16.7 pitch=250, 12.5 pitch=188, 10 pitch=150 |
| ANADDEX, INC. | DP/9500B | \$1280 | 16.38 × 27.75 | 13.3 pitch=240, 12 pitch=216, 10 pitch=180 |
| ANADDEX, INC. | DP/9501B | \$1280 | 16.38 × 27.75 | 16.7 pitch=250, 12.5 pitch=188, 10 pitch=150 |
| ANADDEX, INC. | DP/9620B | \$1380 | 16.38 × 27.75 | draft=240, 16.7 pitch=197, 10 pitch=120 |
| ANADDEX, INC. | DP/9625B | \$1500 | 16.38 × 27.75 | draft=240, normal=197, near-let=72 |
| ANADDEX, INC. | DP/9725B | \$1625 | 16.38 × 27.75 | draft=240, normal=197, near-let=72 |
| ANADDEX, INC. | DP/6500 | \$2995 | 16.38 × 27.75 | draft=540, normal=410, near-let=150 |
| ANADDEX, INC. | WP/6000 | \$2700 | 18.4 × 29.5 | draft=276, corres.=284, data=276, letter=150 |
| ANDERSON JACOBSON | AJ864 | \$2995 | 21.4 × 23.5 | 180 |
| ANTEX DATA SYSTEMS | ADS 2000 | \$450 | 11.5 × 16 | draft=165, let qual=42 |
| APPLE COMPUTER, INC. | ImageWriter | \$595 | 11.2 × 16.2 | 120 |
| AXIOM CORP. | GP-100AT | \$299 | 9 × 16 | 50 |
| AXIOM CORP. | GP-100 | \$219 | 9 × 16 | 30 |
| AXIOM CORP. | GP-100TI | \$309 | 9 × 16 | 50 |
| AXIOM CORP. | GP-550 | \$299 | 12 × 16.5 | draft=86, near-let=43 |
| AXIOM CORP. | GP-550AT | \$319 | 12 × 16.5 | draft=86, near-let=43 |
| AXIOM CORP. | GP-700 | \$599 | 12.6 × 17.75 | 50 |
| AXONIX CORP. | Axonix ThinPrint | \$279 | 7.5 × 11.5 | 40 |
| CANON | PW-1156A | \$895 | 13.8 × 23.5 | 160 |
| CANON | PW-1080A | \$595 | 12.625 × 15.75 | 160 |
| C. ITOH ELECTRONICS, INC. | Model 1550B | \$830 | 11.8 × 19.8 | 120 |
| C. ITOH ELECTRONICS, INC. | Model 1550S | \$1125 | 11.8 × 21.5 | draft=180, near-let=120 |
| C. ITOH ELECTRONICS, INC. | Model 1550SC | \$1225 | 11.8 × 21.5 | draft=180, near-let=120 |
| C. ITOH ELECTRONICS, INC. | Model 1570 | \$2000 | na | draft=180, letter=130 |
| C. ITOH ELECTRONICS, INC. | Model 8510B | \$495 | 11.2 × 15.7 | 120 |
| C. ITOH ELECTRONICS, INC. | Model 8510S | \$794 | 11.7 × 16.5 | draft=180, near-let=120 |
| C. ITOH ELECTRONICS, INC. | Model 8150SC | \$895 | 11.2 × 15.7 | draft=180, near-let=120 |
| C. ITOH ELECTRONICS, INC. | Model 7500E | \$450 | na | 105 |
| COMPUTERS INTERNATIONAL, INC. | Multiwriter 9 | \$695 | 12.2 × 16.3 | draft=180, corres.=25 |

| Interface Options | Multiple Print Styles? | Graphics? | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options | Noise Level (dBA) | No. Print Modes |
|----------------------|------------------------|-----------|--------|-----------|----------------|-------------------|-----------------------|-------------------|-----------------|
| serial | Y | Y | Y | 232 | Y | friction | tractor, sheet feeder | 55 | 3 |
| parallel, serial | N | Y | N | 106 | Y | tractor | none | 55 | 1 |
| parallel, serial | N | Y | N | 133 | Y | tractor | none | 55 | 1 |
| parallel, serial | N | Y | N | 176 | Y | tractor | none | 55 | 1 |
| parallel, serial | N | Y | N | 220 | Y | tractor | none | 55 | 1 |
| parallel, serial | N | Y | N | 216 | Y | tractor | none | 55 | 2 |
| parallel, serial | N | Y | N | 216 | Y | tractor | none | 55 | 3 |
| parallel, serial | N | Y | Y | 216 | Y | tractor | none | 55 | 3 |
| parallel | N | Y | N | 216 | Y | tractor, friction | sheet feeder | 65 | 3 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | sheet feeder | 65 | 4 |
| serial | N | Y | N | 250 | Y | tractor | none | 75 | 3 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | 60 | 2 |
| serial | Y | Y | Y | 160 | Y | friction, pin | none | 53 | 1 |
| Atari | N | Y | N | 80 | N | tractor | none | na | 1 |
| Apple | N | Y | N | 80 | N | tractor | none | na | 1 |
| TI 99/4A | N | Y | N | 80 | N | tractor | none | na | 1 |
| IBM, Apple, TI 99/4A | Y | Y | N | 136 | N | tractor, friction | none | na | 2 |
| Atari | Y | Y | N | 136 | N | tractor, friction | none | na | 2 |
| IBM, Atari, TI 99/4A | N | Y | Y | 106 | N | tractor, friction | none | na | 1 |
| parallel, serial | N | Y | Y | 136 | Y | friction | none | na | 1 |
| parallel, serial | Y | Y | N | 265 | Y | tractor, friction | none | 60 | 10 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | 60 | 10 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | Y | 136 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | Y | 136 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | N | 80 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 80 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | Y | 80 | Y | tractor, friction | none | na | 2 |
| parallel | Y | Y | N | 80 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 80 | Y | tractor, friction | none | 55 | 2 |

BUYER'S GUIDE TO DOT-MATRIX PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|-------------------------------|-------------------------|--------|------------------------|--|
| COMPUTERS INTERNATIONAL, INC. | Multiwriter 24 | \$1995 | 15 × 21.7 | draft=240, corres.=160, letter=80 |
| DATAPRODUCTS CORP. | M200 | \$3000 | 23.4 × 26.6 | 340 |
| DATAPRODUCTS CORP. | M100L | \$4200 | 23.4 × 26.6 | 140 |
| DATAPRODUCTS CORP. | M120 | \$2600 | 23.4 × 26.6 | 180 |
| DATAPRODUCTS CORP. | 8050 | \$1695 | 13.75 × 24.25 | data=200, text=110, letter=35 |
| DATAPRODUCTS CORP. | 8010 | \$649 | 13.59 × 16.74 | data=180, text=90, letter=30 |
| DATAPRODUCTS CORP. | 8020 | \$849 | 13.59 × 16.74 | data=180, text=90, letter=30 |
| DATAPRODUCTS CORP. | P-80 | \$1295 | 12.4 × 16.6 | draft=200, proportional=150, enhanced=100 |
| DATAPRODUCTS CORP. | P-132 | \$1495 | 12.4 × 21.6 | draft=200, proportional=150, enhanced=100 |
| DATAPRODUCTS CORP. | 8070 | \$2195 | 13.75 × 24.25 | data=400, text=200, letter=75 |
| DATASOUTH COMPUTER CORP. | DS 180 | \$1595 | 16 × 24 | 180 |
| DATASOUTH COMPUTER CORP. | DS 220 | \$1995 | 16 × 24 | draft=220, memo=90, near-let=40 |
| DIABLO SYSTEMS, INC. | P30 | \$2195 | 16 × 36 | 400 |
| DIABLO SYSTEMS, INC. | P38 | \$2195 | 16.1 × 22 | 400 |
| DIABLO SYSTEMS, INC. | S38 | \$2345 | 16 × 36 | 400 |
| DIABLO SYSTEMS, INC. | P32 CO | \$995 | 16 × 36 | draft=150, corres=60, |
| DIABLO SYSTEMS, INC. | S32 CQ | \$1095 | 16 × 36 | draft=150, corres=60 |
| DIABLO SYSTEMS, INC. | P12CQI | \$699 | 12.6 × 16.3 | draft=150, corres=60 |
| DIABLO SYSTEMS, INC. | P11 | \$749 | 16 × 35 | draft=100, corres=30 |
| DIABLO SYSTEMS, INC. | S11 | \$749 | 16 × 35 | draft=100, corres=30 |
| DIABLO SYSTEMS, INC. | P10I | \$499 | 12.6 × 16.3 | 80 |
| DIGITAL EQUIPMENT CORP. | LA50 Personal Printer | \$695 | 11.2 × 15.7 | draft=100, memo=50 |
| DIGITAL EQUIPMENT CORP. | LA100 PC Letter Printer | \$1595 | 15.5 × 22 | draft=240, memo=80, near-let=30 |
| DIGITAL EQUIPMENT CORP. | LA100 XC Letter Printer | \$1595 | 15.5 × 22 | draft=240, memo=80, near-let=30 |
| DIGITAL EQUIPMENT CORP. | DuraWriter Plus | \$1395 | 13.5 × 25.25 | draft=180, near-let=45 |
| DYNAX, INC. | Fortis DM20 | \$775 | 13.4 × 25 | draft=160, near-let=25—30 |
| EPSON AMERICA, INC. | FX-80 | \$599 | 13.9 × 23.4 | 160 |
| EPSON AMERICA, INC. | FX-100 | \$895 | 13.9 × 23.4 | 160 |
| EPSON AMERICA, INC. | RX-80 | \$399 | 11.93 × 14.65 | 100 |
| EPSON AMERICA, INC. | RX-80 FT | \$499 | 11.93 × 14.65 | 100 |

| Interface Options | Multiple Print Styles? | Graphics? | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options | Noise Level (dBA) | No. Print Modes |
|-------------------|------------------------|-----------|--------|-----------|----------------|-----------------------|-------------------|-------------------|-----------------|
| parallel, serial | Y | Y | Y | 136 | Y | tractor, friction | none | 55 | 3 |
| parallel, serial | N | N | N | 220 | Y | tractor | none | 62 | 1 |
| parallel, serial | Y | N | N | 220 | Y | tractor | none | 62 | 1 |
| parallel, serial | N | N | N | 220 | Y | tractor | none | 62 | 1 |
| parallel, serial | Y | Y | Y | 225 | Y | tractor, sheet feeder | auto sheet feeder | 65 | 3 |
| parallel, serial | Y | N | N | 136 | Y | tractor, sheet feeder | auto sheet feeder | 65 | 3 |
| parallel, serial | Y | Y | N | 225 | Y | tractor, sheet feeder | auto sheet feeder | 65 | 3 |
| parallel, serial | Y | Y | N | 132 | Y | tractor, friction | sheet feeder | 65 | 4 |
| parallel, serial | Y | Y | N | 221 | Y | tractor, friction | sheet feeder | 65 | 4 |
| parallel | Y | Y | N | 225 | Y | tractor, sheet feeder | auto sheet feeder | 65 | 3 |
| parallel, serial | N | Y | N | 217 | Y | tractor | none | 64 | 1 |
| parallel, serial | Y | Y | N | 217 | Y | tractor, friction | none | 67 | 3 |
| parallel | Y | N | N | 220 | Y | tractor | none | na | 1 |
| parallel | N | N | N | 132 | Y | tractor | none | na | 1 |
| serial | Y | N | N | 200 | Y | tractor | none | na | 1 |
| parallel | Y | Y | N | 220 | Y | tractor | none | na | 2 |
| serial | Y | Y | N | 220 | Y | tractor | none | na | 2 |
| parallel | N | Y | N | 132 | Y | tractor, friction | none | 58 | 2 |
| parallel | Y | Y | N | 132 | N | tractor | none | na | 2 |
| serial | Y | Y | N | 132 | N | tractor | none | na | 2 |
| parallel | N | Y | N | 132 | Y | tractor, friction | none | 58 | 2 |
| serial | Y | Y | N | 132 | Y | friction, tractor | none | na | 2 |
| serial | Y | Y | N | 217 | Y | friction, tractor | roll paper | na | 3 |
| parallel | Y | Y | N | 217 | Y | friction, tractor | roll paper | na | 3 |
| parallel, serial | N | Y | N | 225 | Y | tractor | none | 60 | 3 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | none | 63 | 3 |
| parallel, serial | Y | Y | N | 136 | Y | pin, friction | tractor | 64 | 1 |
| parallel, serial | Y | Y | N | 136 | Y | pin, friction | tractor | 64 | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor | none | 65 | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | 65 | 1 |

BUYER'S GUIDE TO DOT-MATRIX PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|---|--------------------|--------|------------------------|---|
| EPSON AMERICA, INC. | RX-100 | \$699 | 15.47 × 23.31 | 100 |
| EPSON AMERICA, INC. | LQ-1500 | \$1395 | 14.29 × 23.78 | 200 |
| FACIT DATA PRODUCTS | Facit 4510 | \$495 | 13.5 × 17.5 | 120 |
| FACIT DATA PRODUCTS | Facit 4512 | \$995 | 13.5 × 25 | 140 |
| FACIT DATA PRODUCTS | Facit 4544 | \$4695 | 18 × 25.2 | draft=535, proportional=250 |
| FACIT DATA PRODUCTS | Facit 4542 | \$3995 | 18 × 25.2 | draft=535, proportional=250 |
| FACIT DATA PRODUCTS | Facit 4528T | \$1395 | 14.75 × 24 | 17 pitch=285, 12 pitch=200, 10 pitch=165 |
| FLORIDA DATA CORP. | OSP 130 | \$4100 | 21.3 × 25 | data=600, corres.=150, letter=100 |
| FLORIDA DATA CORP. | Model 3000 | \$3795 | 21.3 × 25 | draft=675, corres.=150 |
| FUJITSU AMERICA, INC. | DPL24 | \$1995 | 15 × 21.7 | draft=240, corres.=160, letter=80 |
| GENICOM | Model 3404 | \$2650 | 16.1 × 25 | draft=400, near-let=100 |
| GENICOM | Model 3014 | \$1199 | 15.6 × 24.7 | draft=160, near-let=32 |
| GENICOM | Model 3024 | \$1499 | 15.6 × 24.7 | draft=200, near-let=40 |
| GENICOM | Model 3180 | \$2030 | 16.1 × 25 | 180 |
| GENICOM | Model 3184 | \$2230 | 16.1 × 25 | draft=180, near-let=45 |
| GENICOM | Model 3300 | \$2250 | 16.1 × 25 | data=300, draft=200 |
| GENICOM | Model 3304 | \$2490 | 16.1 × 25 | data=300, draft=200, near-let=100 |
| GENICOM | Model 3400 | \$2450 | 16.1 × 25 | 400 |
| HEWLETT-PACKARD | HP-82905B | \$795 | 12 × 14.7 | 80 |
| HEWLETT-PACKARD | HP-2934A | \$2895 | na | memo=200, near let.=67 |
| IBM | PC Color Printer | \$1995 | 12.4 × 21.6 | standard=200, near let.=35 |
| INFORUNNER | Writeman Plus | \$399 | 10.625 × 13.5 | 120 |
| INFORUNNER | Writeman Blue Plus | \$499 | 10.625 × 13.5 | 140 |
| INFORUNNER | Writeman II | \$549 | 10.625 × 13.5 | 160 |
| INFORUNNER | Writeman 15 | \$799 | 12.5 × 23 | 160 |
| LEAR SIEGLER, INC., Data Products Div. | VersaPrint 500 | \$1695 | 18 × 10 | draft=180, memo=90, near-let=45 |
| LEAR SIEGLER, INC., Data Products Div. | VersaPrint 520 | \$2195 | 18 × 24 | draft=180, memo=90, near-let=45 |
| LEGEND PERIPHERAL PRODUCTS Div. Cal-Abco | Legend 880 | \$289 | 11.6 × 14.8 | 80 |
| LEGEND PERIPHERAL PRODUCTS Div. Cal-Abco | Legend 1000 | \$359 | 13.3 × 15.7 | 110 |
| MANNESMAN TALLY CORP. | Spirit | \$399 | 12.75 × 14.8 | 80 |
| MANNESMAN TALLY CORP. | MT160 | \$795 | 9.64 × 13.7 | data=160, near-let=40 |
| MANNESMAN TALLY CORP. | MT180 | \$998 | 9.6 × 19.1 | data=160, near-let=40 |

| Interface Options | Multiple Print Styles? | Graphics? | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options | Noise Level (dBA) | No. Print Modes |
|-------------------|------------------------|-----------|--------|-----------|----------------|-------------------------|--------------|-------------------|-----------------|
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | 65 | 1 |
| parallel, serial | Y | Y | N | 272 | Y | friction | tractor | 65 | 3 |
| parallel, serial | N | Y | N | 80 | Y | tractor, friction | none | 60 | 2 |
| parallel, serial | N | Y | N | 132 | Y | tractor, friction | none | 60 | 3 |
| parallel, serial | N | Y | Y | 150 | Y | tractor | none | 60 | 2 |
| parallel, serial | N | Y | Y | 150 | Y | tractor | none | 60 | 2 |
| parallel, serial | Y | Y | N | 136 | Y | tractor | none | 60 | 2 |
| parallel, serial | Y | Y | N | 132 | Y | tractor or sheet feeder | none | 65 | 3 |
| parallel, serial | Y | Y | N | 132 | Y | tractor | none | na | 3 |
| parallel, serial | Y | Y | N | 244 | Y | tractor, sheet feeder | sheet feeder | 60 | 3 |
| parallel, serial | N | Y | N | 136 | Y | tractor, friction | sheet feeder | 63 | 2 |
| parallel, serial | Y | N | N | 136 | Y | tractor, friction | sheet feeder | 65 | 3 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | sheet feeder | 65 | 3 |
| parallel, serial | N | N | N | 136 | Y | tractor, friction | none | 60 | 1 |
| parallel, serial | N | N | N | 136 | Y | tractor, friction | none | 60 | 2 |
| parallel, serial | N | N | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | N | N | N | 136 | Y | tractor, friction | none | 60 | 3 |
| parallel, serial | N | N | N | 136 | Y | tractor, friction | none | 60 | 1 |
| parallel, serial | Y | Y | N | 132 | Y | pin | tractor | na | 1 |
| parallel, serial | Y | Y | N | 223 | Y | tractor | none | 63 | 3 |
| parallel | N | Y | Y | 132 | Y | tractor, sheet feeder | none | 64 | 3 |
| parallel, serial | N | Y | N | 132 | Y | friction | tractor | 64 | 4 |
| parallel, serial | N | Y | N | 132 | Y | friction | tractor | 64 | 4 |
| parallel, serial | N | Y | N | 132 | Y | friction | tractor | 64 | 4 |
| parallel, serial | N | Y | N | 132 | Y | tractor, friction | none | 64 | 4 |
| parallel, serial | Y | Y | N | 228 | Y | tractor | none | 55 | 3 |
| parallel, serial | Y | Y | Y | 228 | Y | tractor | none | 55 | 3 |
| parallel, serial | Y | Y | N | 142 | Y | tractor, friction | none | 50 | 2 |
| parallel, serial | Y | Y | N | 132 | Y | tractor, friction | none | 50 | 2 |
| parallel, serial | Y | Y | N | 142 | Y | tractor | none | 60 | 1 |
| parallel, serial | Y | Y | N | 160 | Y | tractor, friction | none | 67 | 2 |
| parallel, serial | Y | Y | N | 160 | N | tractor, friction | none | 67 | 2 |

BUYER'S GUIDE TO DOT-MATRIX PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|---|--------------------|--------|---------------------|---|
| MANNESMAN TALLY CORP. | MT1600 | \$1695 | 19.5 × 25.5 | 200 |
| MANNESMAN TALLY CORP. | MT1800 | \$1995 | 19.5 × 25.5 | data=200, near-let=50 |
| MANNESMAN TALLY CORP. | MT420 | \$2295 | 18.2 × 26.3 | data=200, near-let=50 |
| MANNESMAN TALLY CORP. | MT440 | \$2695 | 18.2 × 26.3 | data=400, near-let=100 |
| MANNESMAN TALLY CORP. | MT1612 | \$1945 | 19.5 × 25.5 | 200 |
| MICRO PERIPHERALS, INC. (MPI) | Print Mate 99 | \$599 | 10.5 × 16 | 100 |
| MICRO PERIPHERALS, INC. (MPI) | Print Mate 150 | \$1045 | 15.7 × 23 | 150 |
| MICRO PERIPHERALS, INC. (MPI) | Sprinter | \$695 | 14.5 × 18 | 160 |
| NEC HOME ELECTRONICS, INC., Personal Computer Div. | PC8023A-N | \$499 | 11.75 × 15.5 | 120 |
| NEC HOME ELECTRONICS, INC., Personal Computer Div. | PC8025 | \$895 | 11.75 × 15.5 | 120 |
| NEC HOME ELECTRONICS, INC., Personal Computer Div. | PC8027A | \$499 | 5 × 15.5 | 120 |
| NEC INFORMATION SYSTEMS | Model P2 Pinwriter | \$799 | 13.1 × 16.1 | high speed=180, high density=90, two-pass=35 |
| NEC INFORMATION SYSTEMS | Model P3 Pinwriter | \$1050 | 13.1 × 22.4 | high speed=180, high density=90, two-pass=35 |
| NORTH ATLANTIC/QANTEX | Model 720 | \$1495 | 16 × 24 | draft=150-180, near-let=75 |
| NORTH ATLANTIC/QANTEX | Model 730 | \$1695 | 16 × 24 | draft=150-180, near-let=75 |
| NORTH ATLANTIC/QANTEX | Model 740 | \$1795 | 16 × 24 | draft=150-180, near-let=75 |
| NORTH ATLANTIC/QANTEX | Model 7065 | \$1995 | 16 × 24 | draft=300, near-let=65 |
| OKIDATA | Microline 82A | \$349 | 12.9 × 14.2 | 120 |
| OKIDATA | Microline 83A | \$749 | 12.9 × 20.2 | 120 |
| OKIDATA | Microline 92 | \$599 | 12.9 × 14.2 | draft=160, enhanced=80, letter=40 |
| OKIDATA | Microline 93 | \$899 | 12.9 × 20.2 | draft=160, enhanced=80, letter=40 |
| OKIDATA | Microline 84 | \$1099 | 12.9 × 20.2 | draft=200, enhanced=100, letter=50 |
| OKIDATA | Pacemark 2350 | \$2395 | 20.5 × 23.5 | draft=350 |
| OKIDATA | Pacemark 2410 | \$2595 | 20.5 × 23.5 | draft=350, enhanced=175, letter=85 |
| OKIDATA | Okidata 10 | \$239 | 7.5 × 13 | 60 |
| OLYMPIA USA, INC. | Compact NP | \$499 | 11.8 × 15.9 | 165 |
| PANASONIC INDUSTRIAL CO. | KX-P1090 | \$399 | 11.3 × 15.9 | pica=80, elite=96 |
| PANASONIC INDUSTRIAL CO. | KX-P1092 | \$599 | 13.8 × 16.3 | draft=180, letter=33 |
| PANASONIC INDUSTRIAL CO. | KX-P1093 | \$899 | 13.4 × 25 | draft=160, letter=25-30 |
| PERSONAL MICRO COMPUTERS | DMP-85 | \$395 | 11.2 × 15.7 | 120 |
| PHILIPS PERIPHERALS, INC. | GP-150 | \$2200 | 12.6 × 17.52 | draft=120, high res=60 |

| Interface Options | Multiple Print Styles? | Graphics? | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options | Noise Level (dBA) | No. Print Modes |
|-------------------|------------------------|-----------|--------|-----------|----------------|------------------------|-----------------------|-------------------|-----------------|
| parallel, serial | N | Y | N | 218 | Y | tractor | none | 59 | 1 |
| parallel, serial | Y | Y | N | 218 | Y | tractor | none | 53 | 2 |
| parallel, serial | N | Y | N | 220 | Y | tractor, friction | sheet feeder | 60 | 2 |
| parallel, serial | N | Y | N | 220 | Y | tractor, friction | sheet feeder | 60 | 2 |
| serial | Y | N | N | 218 | Y | tractor | none | 58 | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | sheet feeder | 63 | 4 |
| parallel, serial | Y | Y | N | 231 | Y | tractor | none | 61 | 5 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | 61 | 6 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| serial | Y | Y | Y | 136 | Y | tractor | sheet feeder | 62 | 3 |
| serial | Y | Y | Y | 233 | Y | tractor | sheet feeder | 62 | 3 |
| parallel, serial | Y | Y | N | 220 | Y | tractor | none | 62 | 2 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | none | 62 | 4 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | none | 62 | 4 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | none | 62 | 5 |
| parallel, serial | Y | N | N | 80 | Y | pin, friction | tractor | 55 | 2 |
| parallel, serial | Y | N | N | 136 | Y | tractor, pin, friction | none | 55 | 3 |
| parallel, serial | Y | Y | N | 80 | Y | friction, friction | tractor | 55 | 3 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, pin, friction | none | 55 | 3 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, pin, friction | none | 55 | 3 |
| parallel, serial | Y | N | Y | 136 | Y | tractor, pin, friction | none | 55 | 2 |
| parallel, serial | Y | Y | Y | 136 | Y | tractor, pin, friction | none | 55 | 3 |
| Commodore, Atari | N | Y | Y | 136 | N | friction, tractor | none | 50 | 1 |
| parallel, | Y | Y | N | 80 | Y | tractor, friction | none | na | 2 |
| parallel | Y | Y | N | 80 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | N | 132 | Y | tractor, friction | none | 60 | 3 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | none | 65 | 2 |
| parallel | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | N | N | 120 | Y | friction | tractor, sheet feeder | 55 | 2 |

BUYER'S GUIDE TO DOT-MATRIX PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|---------------------------------|---------------------------|--------|------------------------|-------------------------------|
| PHILIPS PERIPHERALS, INC. | GP-300 | \$2800 | 12.6 × 17.52 | draft = 300, high res = 80 |
| PHILIPS PERIPHERALS, INC. | GP-300L | \$2995 | 20 × 25 | draft = 300, high res = 80 |
| PRACTICAL AUTOMATION, INC. | PLP-8 | \$728 | 13 × 17.125 | 275 |
| PRINTEK | Model 910 | \$1595 | 17 × 23.125 | draft = 200, corres = 40 |
| PRINTEK | Model 920 | \$2395 | 17 × 23.125 | draft = 340, corres = 80 |
| PRINTEK | Model 930 | \$1995 | 17 × 23.125 | draft = 200, medium-qual = 80 |
| SCM CORP. Smith-Corona Group | D100 | \$395 | 13.4 × 16.7 | 120 |
| SCM CORP. Smith-Corona Group | D200 | \$595 | 13.4 × 16.7 | 120 |
| SCM CORP. Smith-Corona Group | D300 | \$795 | 14.4 × 24.8 | 140 |
| SCM CORP. Smith-Corona Group | Fastext 80 | \$259 | 9 × 16.5 | 80 |
| STAR MICRONICS | Gemini 10X | \$399 | 12.4 × 13.2 | 120 |
| STAR MICRONICS | Gemini 15X | \$549 | 12.4 × 21.3 | 120 |
| STAR MICRONICS | Delta 10 | \$649 | 12.4 × 13.2 | 160 |
| STAR MICRONICS | Delta 15 | \$799 | 12.4 × 13.2 | 160 |
| STAR MICRONICS | Radix 10 | \$849 | 13.6 × 16.3 | 200 |
| STAR MICRONICS | Radix 15 | \$995 | 13.6 × 21.9 | 200 |
| TANDY CORP./RADIO SHACK | DMP-110 | \$399 | 12.44 × 16.5 | data = 50, word pro = 25 |
| TANDY CORP./RADIO SHACK | DMP-120 | \$500 | 13.5 × 16.5 | 120 |
| TANDY CORP./RADIO SHACK | DMP-200 | \$699 | 13.5 × 16.5 | 120 |
| TANDY CORP./RADIO SHACK | DMP-420 | \$999 | 13.37 × 24.12 | 140 |
| TANDY CORP./RADIO SHACK | DMP-500 | \$1295 | 15.87 × 24.62 | 220 |
| TANDY CORP./RADIO SHACK | DMP-2100 | \$1995 | 15 × 21 | data = 160, word pro = 100 |
| TEXAS INSTRUMENTS | Model 850 (friction feed) | \$599 | 13 × 16.2 | 150 |
| TEXAS INSTRUMENTS | Model 850 (tractor feed) | \$659 | 13 × 16.2 | 150 |
| TEXAS INSTRUMENTS | Model 855 (friction feed) | \$935 | 13 × 16.2 | draft = 150, near-let = 245 |
| TEXAS INSTRUMENTS | Model 855 (tractor feed) | \$995 | 13 × 16.2 | draft = 150, near-let = 245 |
| TOSHIBA | P1351 | \$1895 | 15 × 21.7 | draft = 192, near-let = 100 |
| TOSHIBA | P1340 | \$995 | 16.5 × 11.6 | draft = 144, near-let = 54 |
| TRANSTAR | Transtar 315 | \$599 | 12.6 × 17.7 | 50 |
| WANG LABORATORIES | PC-PM010 | \$900 | 12 × 14.7 | 80 |

| Interface Options | Multiple Print Styles? | Graphics? | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options | Noise Level (dBA) | No. Print Modes |
|-------------------|------------------------|-----------|--------|-----------|----------------|-------------------|----------------------------|-------------------|-----------------|
| parallel, serial | Y | Y | N | 180 | Y | friction | tractor, sheet feeder | 55 | 2 |
| parallel, serial | Y | Y | Y | 144 | Y | friction | tractor, sheet feeder | 51 | 2 |
| parallel | Y | N | N | 132 | Y | tractor | none | 62 | 1 |
| parallel, serial | Y | Y | N | 227 | Y | tractor | none | 60 | 3 |
| parallel, serial | Y | Y | N | 227 | Y | tractor | none | 60 | 3 |
| parallel, serial | Y | Y | N | 220 | Y | tractor, friction | sheet feeder | 55 | 3 |
| parallel, serial | Y | Y | N | 80 | Y | tractor, friction | roll paper feeder | 63 | 2 |
| parallel, serial | Y | Y | N | 80 | Y | tractor, friction | roll paper feeder | 63 | 3 |
| parallel, serial | Y | Y | N | 132 | Y | tractor, friction | none | 63 | 3 |
| parallel, serial | Y | Y | N | 80 | Y | friction | tractor, roll paper feeder | 83 | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 232 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 232 | Y | tractor, friction | none | na | 1 |
| parallel, serial | Y | Y | N | 136 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | N | 233 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | N | 132 | N | tractor, friction | none | na | 3 |
| parallel, serial | N | Y | N | 132 | Y | tractor, friction | none | na | 2 |
| parallel, serial | Y | Y | N | 132 | Y | tractor, friction | none | na | 3 |
| parallel, serial | Y | Y | N | 132 | Y | tractor, friction | none | na | 3 |
| parallel | Y | Y | N | 220 | Y | tractor, friction | none | na | 3 |
| parallel | Y | Y | N | 132 | Y | friction | tractor | na | 3 |
| parallel, serial | Y | Y | N | 132 | Y | friction | none | 62 | 1 |
| parallel, serial | Y | Y | N | 132 | Y | tractor | none | 62 | 1 |
| parallel, serial | Y | Y | Y | 132 | Y | friction | sheet feeder | 62 | 2 |
| parallel, serial | Y | Y | Y | 132 | Y | tractor | sheet feeder | 62 | 2 |
| parallel, serial | Y | Y | N | 226 | Y | friction | tractor, sheet feeder | na | 3 |
| parallel, serial | Y | Y | N | 132 | Y | pin, friction | none | na | 3 |
| parallel, serial | N | Y | Y | 106 | N | pin, friction | none | 60 | 1 |
| parallel | Y | Y | N | 132 | Y | pin | none | na | 1 |

BUYER'S GUIDE TO LETTER-QUALITY PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|--|--------------------------|--------|------------------------|----------------------|
| APPLE COMPUTER, INC. | Apple Daisywheel Printer | \$2165 | 14.84 × 23.22 | 40 |
| AXONIX CORP. | AXONIX ThinType 80 | \$395 | 7.5 × 11.5 | 15 |
| BROTHER INTERNATIONAL CORP. | HR 15 | \$599 | 13.3 × 18.3 | 13 |
| BROTHER INTERNATIONAL CORP. | HR 25 | \$895 | 15.2 × 21.2 | 23 |
| BROTHER INTERNATIONAL CORP. | HR 35 | \$1295 | 15.2 × 21.2 | 32 |
| CARDCO, INC. | LQ-2 | \$350 | 7.8 × 11.7 | 12 |
| C. ITOH ELECTRONICS, INC. | A-10/30 | \$795 | 13.7 × 20.4 | 30 |
| C. ITOH ELECTRONICS, INC. | F-10/40 | \$1795 | 15.9 × 22.5 | 40 |
| C. ITOH ELECTRONICS, INC. | F-10/55 | \$1995 | 15.9 × 22.5 | 55 |
| C. ITOH ELECTRONICS, INC. | Y-10 | \$550 | na | 15 |
| COMPUTERS INTERNATIONAL, INC. | Daisywriter 2000 | \$1495 | 14.7 × 22.4 | 40 |
| DATAPRODUCTS CORP. | DP-35 | \$1795 | 17.5 × 23.8 | 35 |
| DATAPRODUCTS CORP. | DP-55 | \$1295 | 17.5 × 23.8 | 55 |
| DIABLO SYSTEMS, INC. | Series 36 | \$1595 | 15.94 × 24.64 | 35 |
| DIABLO SYSTEMS, INC. | Model 620 API | \$1095 | 17 × 25 | 25 |
| DIABLO SYSTEMS, INC. | Model 630 API | \$2340 | na | 40 |
| DIABLO SYSTEMS, INC. | Model 630 ECS | \$2595 | na | 40 |
| DIABLO SYSTEMS, INC. | Model 630 KSR | \$3325 | na | 40 |
| DIABLO SYSTEMS, INC. | Series 80 IF | \$3495 | na | 80 |
| FACIT DATA PRODUCTS, INC. | Facit 4560 | \$895 | 15.7 × 21.8 | 22 |
| FACIT DATA PRODUCTS, INC. | Facit 4565 | \$1595 | 15.9 × 22.6 | 40 |
| FUJITSU AMERICA, INC. | SP320 | \$1499 | 15 × 21.7 | 48 |
| FUJITSU AMERICA, INC. | SP830 | \$2950 | 17.9 × 23.5 | 80 |
| HEWLETT-PACKARD | HP-2602A | \$1545 | 17.75 × 24.25 | 25 |
| HEWLETT-PACKARD | HP-2601A | \$3520 | 18.45 × 24.34 | 32—40 |
| JUKI INDUSTRIES OF AMERICA, INC. | Model 6100 | \$599 | 17.9 × 20.5 | 18 |
| NEC HOME ELECTRONICS INC., Personal Computer Div. | Authentic 15LQ | \$695 | 13 × 17 | 40 |
| NEC INFORMATION SYSTEMS | Model 2050 Spinwriter | \$1250 | 14.5 × 21.6 | 20 |
| NEC INFORMATION SYSTEMS | Model 3550 Spinwriter | \$1895 | 14.7 × 22 | 35 |
| NEC INFORMATION SYSTEMS | Model 8850 Spinwriter | \$2495 | 16.1 × 22.4 | 55 |
| OLYMPIA USA, INC. | Compact RO | \$649 | 12.6 × 19.5 | 14 |
| OLYMPIA USA, INC. | ESW 102 | \$999 | 14.6 × 23 | 20 |
| OLYMPIA USA, INC. | ESW 3000 | \$1899 | 16.1 × 23.8 | 50 |
| PANASONIC INDUSTRIAL CO. | KX-3151 | \$699 | 15 × 22.1 | 22 |
| PRIMAGES, INC. | Primages I | \$1875 | 15.5 × 24.5 | 45 |

| Interface Options | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options? | Noise Level (dBA) | Type Of Print Wheel | Print Wheel Price |
|-------------------|--------|-----------|----------------|-------------------|-----------------------|-------------------|-------------------------------|-------------------|
| serial | N | 198 | Y | tractor, friction | none | na | daisywheel | \$30 |
| parallel, serial | Y | 80 | Y | tractor | none | na | drum | na |
| parallel, serial | Y | 110 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$25 |
| parallel, serial | Y | 132 | Y | friction | tractor, sheet feeder | na | daisywheel | \$25 |
| na | Y | 132 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$25 |
| parallel | N | 80 | Y | friction | none | na | rotating drum | na |
| parallel, serial | N | 115 | Y | tractor, friction | none | 62 | daisywheel | na |
| parallel, serial | N | 136 | Y | tractor, friction | none | 65 | daisywheel | na |
| parallel, serial | Y | 136 | Y | tractor, friction | none | 65 | daisywheel | na |
| parallel, serial | N | 115 | Y | tractor, friction | none | na | daisywheel | na |
| parallel, serial | N | 158 | Y | friction | tractor | 60 | daisywheel | \$25 |
| parallel, serial | N | 196 | Y | friction | tractor, sheet feeder | 60 | daisywheel | \$8 |
| parallel, serial | N | 196 | Y | friction | tractor, sheet feeder | 60 | daisywheel | \$8 |
| parallel, serial | N | 132 | Y | friction | tractor, sheet feeder | 62 | daisywheel | na |
| parallel, serial | N | 198 | Y | friction | tractor | 65 | daisywheel | na |
| parallel, serial | N | 198 | Y | friction | tractor | 62 | daisywheel | na |
| parallel, serial | N | 198 | Y | friction | tractor | 62 | daisywheel | na |
| parallel, serial | N | 198 | Y | friction | tractor | 62 | daisywheel | na |
| parallel, serial | N | 264 | Y | sheet feeder | none | 58 | daisywheel | na |
| serial, parallel | N | 130 | N | friction | tractor, sheet feeder | 60 | daisywheel | \$30 |
| serial, parallel | N | 136 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$9 |
| parallel, serial | N | 163 | Y | friction | tractor, sheet feeder | 60 | daisywheel | na |
| parallel, serial | N | 136 | Y | friction | tractor, sheet feeder | 60 | daisywheel | na |
| serial | N | 158 | Y | friction | tractor | na | daisywheel | na |
| serial | N | 158 | Y | friction | tractor | na | daisywheel | na |
| parallel, serial | N | 220 | Y | friction | tractor | 62 | daisywheel | \$22 |
| parallel | N | 80 | Y | tractor | none | na | daisywheel | \$14 |
| serial | Y | 203 | Y | friction | tractor, sheet feeder | 60 | thimble | \$19 |
| serial | Y | 203 | Y | friction | tractor, sheet feeder | 60 | thimble | \$19 |
| serial | Y | 203 | Y | friction | tractor, sheet feeder | 56 | thimble | \$19 |
| parallel, serial | N | 172 | Y | tractor, friction | none | na | Olympia 100-char, print wheel | \$26 |
| parallel, serial | N | 212 | Y | friction | tractor, sheet feeder | na | Olympia 96-char, print wheel | \$26 |
| parallel, serial | N | 225 | Y | friction | tractor, sheet feeder | na | Olympia 100-char, print wheel | \$26 |
| parallel, serial | N | 198 | Y | friction | tractor, sheet feeder | 63 | daisywheel | na |
| parallel, serial | N | 132 | Y | friction | tractor, sheet feeder | 65 | daisywheel | na |

BUYER'S GUIDE TO LETTER-QUALITY PRINTERS

| Company | Product | Price | Depth × Width (in.) | Print Speed (cps) |
|------------------------------|---------------------------|--------|------------------------|-------------------------|
| QUME CORP. | LetterPro 20 | \$795 | 14 × 20.5 | 20 |
| QUME CORP. | Sprint 11/40 Plus | \$1776 | na | 40 |
| QUME CORP. | Sprint 11/40-130 Plus | \$2440 | 14.84 × 24.41 | 40 |
| QUME CORP. | Sprint 11/55 Plus | \$1990 | 14.8 × 24.4 | 55 |
| QUME CORP. | Sprint 11/55 Plus Model 2 | \$2090 | 14.8 × 24.4 | 55 |
| QUME CORP. | Sprint 11/90 Plus | \$2700 | 14.8 × 24.4 | 90 |
| QUME CORP. | Sprint 11 Plus Widetrack | \$3235 | 14.8 × 32.5 | 50 |
| RICOH CORP. | RP 1200 | \$895 | 14.2 × 20.5 | AAA text=25, Shannon=20 |
| RICOH CORP. | RP 1500Q | \$1695 | 15.2 × 24 | AAA text=40, Shannon=35 |
| RICOH CORP. | RP 1600Q | \$1995 | 17.9 × 25.7 | AAA text=50, Shannon=45 |
| RICOH CORP. | RP 2200Q | \$895 | 12.2 × 23.3 | AAA text=22, Shannon=20 |
| SANYO BUSINESS SYSTEMS CORP. | PR5500 | \$995 | 14.9 × 22.9 | 16 |
| SANYO BUSINESS SYSTEMS CORP. | PR5000 | \$595 | 12.4 × 17.5 | 14 |
| SILVER-REED AMERICA, INC. | EXP 400 | \$399 | 12.4 × 15.6 | 12 |
| SILVER-REED AMERICA, INC. | EXP 500 | \$599 | 11.9 × 17.5 | 16 |
| SILVER-REED AMERICA, INC. | EXP 500 (serial) | \$649 | 11.9 × 17.5 | 16 |
| SILVER-REED AMERICA, INC. | EXP 550 | \$699 | 15 × 21 | 19 |
| SILVER-REED AMERICA, INC. | EXP 550 (serial) | \$749 | 15 × 21 | 19 |
| SOLTEC CORP. | EXP 770 | \$1295 | 14.9 × 22.9 | 36 |
| STAR MICRONICS | EXP 770 (serial) | \$1395 | 14.9 × 22.9 | 36 |
| STAR MICRONICS | PowerType Daisywheel | \$499 | 14.3 × 19.6 | 18 |
| SWINTEC CORP. | CompuMate 2100 | \$649 | 12.5 × 19.5 | 20 |
| TANDY CORP./RADIO SHACK | DWP-410 | \$1295 | 13 × 23.75 | 25 |
| TANDY CORP./RADIO SHACK | DWP-510 | \$1495 | 15.5 × 24.5 | 43 |
| TANDY CORP./RADIO SHACK | DWP-210 | \$599 | 13.69 × 20 | 18 |
| TELEVIDEO | TP750 | \$1595 | 16 × 22.5 | 50 |
| TRANSTAR | TI20 | \$550 | 12 × 17.5 | 14 |
| TRANSTAR | TI30 | \$699 | 14 × 23 | 18 |
| TRANSTAR | Transtar 140 | \$1695 | 16 × 24 | 40 |
| TTX, INC. | TTX Daisywheel | \$499 | 12.5 × 18.25 | 14 |
| TTX, INC. | TTX Plus Daisywheel | \$599 | 12.25 × 18.25 | 14 |
| WANG LABORATORIES | PC-PM012 | \$1295 | 17.75 × 24.25 | 20 |
| WANG LABORATORIES | PC-PM014 | \$2995 | 18 × 24 | 55 |

| Interface Options | Color? | Max. Col. | Bidirectional? | Paper Feed? | Feed Options? | Noise Level (dBA) | Type Of Print Wheel | Print Wheel Price |
|-------------------|--------|-----------|----------------|-----------------------|-----------------------|-------------------|---------------------|-------------------|
| parallel, serial | N | 165 | Y | friction | tractor, sheet feeder | 59 | daisywheel | \$15 |
| parallel, serial | N | 198 | Y | friction | tractor, sheet feeder | 63 | daisywheel | \$15 |
| parallel, serial | N | 198 | Y | friction | tractor, sheet feeder | 63 | daisywheel | \$21 |
| parallel, serial | N | 198 | Y | friction | tractor, sheet feeder | 63 | daisywheel | \$15 |
| parallel, serial | N | 198 | Y | friction | tractor, sheet feeder | 60 | daisywheel | \$15 |
| parallel, serial | N | 198 | Y | friction | tractor, sheet feeder | 62 | daisywheel | \$15 |
| parallel, serial | N | 293 | Y | friction | tractor | 63 | daisywheel | \$21 |
| parallel, serial | N | 165 | Y | friction | tractor | 57 | double daisywheel | \$40 |
| parallel, serial | N | 163 | Y | friction | tractor, sheet feeder | 50 | double daisywheel | \$40 |
| parallel, serial | N | 204 | Y | friction | tractor, sheet feeder | 50 | double daisywheel | \$40 |
| parallel, serial | N | 204 | Y | friction | tractor, sheet feeder | 50 | daisywheel | na |
| parallel | N | 132 | Y | friction | tractor | 65 | daisywheel | \$15 |
| parallel | N | 151 | Y | friction | tractor | 65 | daisywheel | \$15 |
| parallel | N | 80 | Y | friction | tractor | 65 | daisywheel | \$18 |
| parallel | N | 80 | Y | friction | tractor | 65 | daisywheel | \$18 |
| serial | N | 80 | Y | friction | tractor | 65 | daisywheel | \$18 |
| parallel | N | 132 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$18 |
| serial | N | 132 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$18 |
| parallel | N | 132 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$18 |
| serial | N | 132 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$18 |
| parallel, serial | N | 165 | Y | tractor, friction | none | na | daisywheel | na |
| parallel, serial | N | na | Y | tractor | sheet feeder | 65 | daisywheel | \$20 |
| parallel | N | 136 | N | friction | tractor | na | daisywheel | \$40 |
| parallel | N | 163 | N | friction | tractor | na | daisywheel | \$40 |
| parallel, serial | N | 132 | Y | friction | tractor | na | daisywheel | \$10 |
| parallel, serial | N | 197 | Y | friction | tractor | 60 | na | na |
| parallel, serial | N | 151 | Y | friction | tractor | 65 | daisywheel | \$18 |
| parallel, serial | N | 225 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$18 |
| serial | N | 225 | Y | friction | tractor, sheet feeder | 65 | daisywheel | \$6 |
| parallel, serial | N | 173 | Y | tractor, friction | sheet feeder | 65 | daisywheel | \$13 |
| parallel, serial | N | 173 | Y | tractor, friction | sheet feeder | 65 | daisywheel | \$13 |
| serial | N | 198 | Y | tractor | sheet feeder | 62 | daisywheel | \$14 |
| serial | N | 198 | Y | tractor, sheet feeder | none | 62 | daisywheel | 3 @ \$20 |



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CIRCLE 29



Formatting Documents On-Screen

If you have questions dealing with hardware, software, or applications, Personal Computing will answer them in this monthly column. Please send your 'need-to-knows' to: Answers, Personal Computing, 10 Mulholland Drive, Hasbrouck Heights, New Jersey 07604.

Q. What is on-screen formatting in word processing software?

A. On-screen formatting can be a confusing feature of word processing software because the phrase is often applied with significantly different meanings. Primarily, on-screen formatting is considered to be the ability to see text on the screen as it will appear on paper from your printer, according to Tom McGuire of MultiMate International, the publishers of the MultiMate word processing package. McGuire, a senior programming analyst, capsulizes on-screen formatting capabilities as a "what you see is what you get" feature.

The confusion about on-screen formatting, McGuire notes, comes in the manner by which a program allows you to format a document and its ability to reformat that same piece of text. Most word processing packages permit you to format a document by having you set things like tabs, margins and space between lines—much the same as you would with a typewriter. Most programs also include a word wrap, or automatic return feature that lets you type and print in the same margin widths. Whether or not you can see the document formatted page by

page on the screen, says McGuire, will depend on your particular program. (MultiMate and WordStar, for example, format by page on the screen, while PIE:Writer requires that you go out of the editing mode to see this.)

Reformatting a document is where on-screen formatting is really put to the test, McGuire says. Effective on-screen formatting will allow you to change the margin from a width of, say, 65 characters to 40 characters in an existing document and will let you see those changes on the screen by shortening the lengths of the lines appropriately. (MultiMate reformats the text on the screen automatically once you change the format settings, WordStar prompts you to execute the changes and PIE:Writer displays what the document will look like only out of the editing mode.)

McGuire explains that on-screen formatting, while possibly not an essential feature of word processors, provides you with better control of what a document which is to be printed will look like because both you and the printer "see" the text in exactly the same form.

Q. What features should I look for in a home financial management package?

A. The answer is going to depend largely on what you want to do with financial management software, according to Gary Kevorkian of Arrays, Inc./Continental Software, producers of The Home Accountant package. Kevorkian, manager of product and sales training at

Continental, explains that you should consider factors such as whether the software is for home use only or some small business use as well, the annual dollar amounts to be managed, the number of budget categories required and the types of printed reports desired.

"The first and most important thing to consider is: What are your own needs?" he notes. "You don't want to tailor your needs around the software. You want the software to tailor to your needs."

Beyond this general guideline, Kevorkian offers several specific features to look for. The flexibility to set up a program according to your own needs and wants—such as determining your own budget categories for incomes and expenses—is a necessary aspect of a good home finance package, he says. He advises avoiding programs that contain preset categories or formats.

The ability to handle any type of transaction you would normally make in the course of daily financial activity is also an essential feature, Kevorkian says. Calculating appreciation and depreciation of your assets, for example, increases precision and financial control. Split transactions, or transactions which need to be spread over a number of budget categories (such as loan principal and interest on a mortgage payment), comprise another obstacle financial management programs should be able to hurdle.

Kevorkian points to a wide variety of printed reports as a very desirable quality of home finance software. Transaction listings, budget versus

actual reports, personal balance sheets, and income and expense summaries are among the reports he says are available. "You're buying a home financial package not only to keep your records, but to give you back information so that you can do a little financial planning of your own," he notes. "And the more printed reports a program offers, the easier that would be for someone."

There are a number of "extras" featured by some home finance programs. Kevorkian mentions check printing, graphics capabilities and the ability to link your program with a tax preparation package as "nice additional features." But he cautions that these and other more essential features may never become useful unless the program has one very important quality—ease of use.

"These are the kind of programs that have been stereotyped in the minds of prospective computer buyers—they're going to revolutionize their lives when they buy a computer," Kevorkian says of the home finance genre of software. "These are the type of programs they buy the day they buy the computer. You have to make a person's first experience with a piece of software as easy as possible or else they're going to get turned off by the whole thing."

The emphasis today is on making a home financial package both easy to use and a more comprehensive planning and management tool, according to Kevorkian.

Q: What is the expected life of a printhead for an Epson MX-100 printer? Also, is it difficult to replace the printhead? And how can I know if weak printout is caused by the printhead or the ribbon?

A: According to a member of the technical support staff at Epson East in Stratford, Conn., the MX-100 printhead has a life expectancy of about 100 million characters. Assuming you produce text

that averages five characters per word, that gives you about 20 million words of text.

Epson says it is not difficult to replace the printhead because it is designed to be easily removable. Pull up the silver lever located under the printhead and the printhead should pop out. The only real test for whether you should replace the ribbon or printhead is to replace the ribbon first. If your printout is still weak, you need a new printhead.

Q: What's the difference between Intel's 8086 chip and the newer 80186 CPU?

A: The essential difference for the user is that the 80186 chip performs twice as fast as the 8086, says Mike Calise, technical sales engineer at Intel's Edison, N.J. office. Calise says the 80186 will process data twice as fast as the 8086 chip.

Another important difference is in the design of the 80186. This chip integrates all of the peripheral chips for the 8086, including the chips for the clock generator, DMA controllers, timers, counters, programmable interrupt controller and various chip selection logic.

In the design of the 80186, all these chips surround the 8086 on a board. By integrating the functions of all of these chips into the 80186 chip, Calise says Intel essentially developed "a board on a chip." Manufacturers who are interested in saving space inside the computer box by freeing a space for another board appreciate the consolidation achieved by the 80186 chip, Calise points out.

Important to this discussion, says Calise, is the fact that the 80186 is completely compatible with the 8086, meaning it will run the same languages, operating systems and software.

Calise also feels it's important to talk about the differences between these two sister chips, the 8086 and

the 80186, and the next step up in Intel chips, the significantly different 80286 chip. "The 80286 is a high-performance microprocessor with memory management and protection," says Calise. Approximately six times faster than the 8086, the 80286 has 16 Mbytes of addressable space, while the 8086 and the 80186 each have only 1Mbyte. What this means for users, claims Calise, is that "the 80286 is an ideal XENIX and Unix processor." The 80286 also provides four levels of data protection for security purposes. Calise says the 80286 is "completely upwardly compatible" with the 8086 and 80186.

Q: I want to buy some software for my preschooler. What kinds of things should such packages contain?

A: There are four basic qualities to look for in preschool software, according to Debbie Kovacs, creative director for software product development at Scholastic, Inc., the educational software publishers.

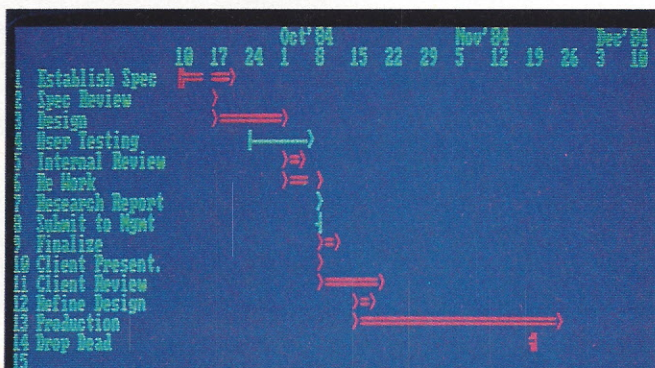
First, says Kovacs, the software should emphasize basic skills—primarily letters and shapes at the preschool level—and present these skills in a manner that involves a child's participation. "I would look for software in those basic skills areas that really emphasize the use of the computer and its interactive possibilities."

A second quality to look for, explains Kovacs, is ease of use. She recommends that the program be joystick controlled and use picture menus in order to avoid any complicated keyboard activity. Each aspect of the program should also have a very clear function to ensure that a child can move through the activities with little trouble.

Another feature that should be in preschool packages is an element Kovacs terms "reusability." The software, she advises, should not be

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ANSWERS

structured in a way that eliminates the possibility of "creative expression." Allowing the child to be creative within the program can expand the number of uses which the software has.

Closely related to the idea of reusability is a multilevel structure, the fourth basic quality that Kovacs recommends. A program that uses shapes, she says, might have the child recognize these shapes as well as associate them with names and patterns. These various levels, she notes, "take advantage of the fact that kids at that age are learning at an extremely rapid rate."

In addition to these four qualities, Kovacs notes a strong recognition factor in preschool software as a key element. Using a licensed character (such as a television or book character) or a familiar setting (like a house) helps make the program more comfortable for the child, she says.

How do you find out whether preschool software has these features? Kovacs suggests looking for magazine software reviews, package descriptions and a "familiar supplier." There are many good packages on the market now, she observes, but says there is "a huge amount of work to be done in the area."

Q. What are the major differences between the Macintosh and Lisa? Why is the Lisa so much more expensive than the Macintosh?

A. John Morand, a technical support representative for Apple Computer, says one of the greatest differences is the memory. The Lisa comes standard with 512k of memory, while the Macintosh has 128k. That is a large cost factor, says Morand. Remember, too, that memory cannot be added to the Macintosh. And the Lisa supports a hard disk drive, while the Macintosh does not.

The Lisa's larger memory lets you have several application packages in memory simultaneously, which also

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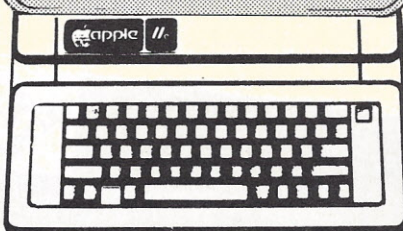
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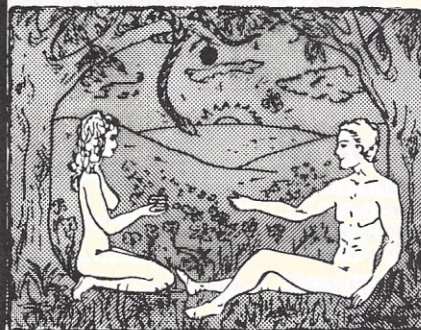
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gives you the use of 16 windows. With Macintosh, you're limited to one program in memory at a time and you have to swap disks to bring up each new program.

All in all, the Lisa has more capabilities suited to business productivity needs than the Macintosh, which is after all, geared to the low-end business and home markets. The Lisa-Write word processing software is "much more powerful and business-oriented than MacWrite, which is generally used for memos and letter writing," according to Morand. And for programmers, Morand says Lisa is the better choice because it offers more powerful languages to program in. Lisa can also print while you are doing something else, while Macintosh cannot. However, you can add a print buffer to Macintosh for \$300 to \$400 which will give you this capability.

Morand hints, however, that Apple has development plans for Macintosh, and "those kinds of things will change." The rumor is that a version of Macintosh with much greater memory may soon be available.

Another interesting aspect of this comparison is the fact that Apple announced Lisa 2 the same day they introduced Macintosh. Lisa 2 looks more like the Macintosh in design than Lisa in that it incorporates a single 3½" microfloppy disk drive, as does Macintosh.

Q. Can FORTRAN be used on a personal computer? If so, which one, and how do I find out more about it?

A. Bantam Books' *Bowker/Bantam 1984 Complete Sourcebook of Personal Computing* lists eight FORTRAN packages available for personal computers. Some of these packages only work on high-end machines with a lot of memory, or under the XENIX operating system.

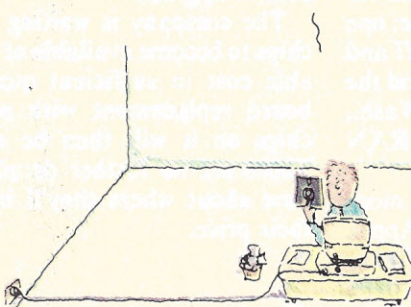
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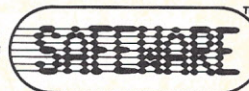
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on more popular machines. One for the Apple II is put out by Apple; one for the Radio Shack Models I, II and III is put out by Radio Shack; and the Microsoft Corp. of Bellevue, Wash., puts out a version of FORTRAN called MS-FORTRAN.

The best way to find out more about them is to contact your Apple, Radio Shack dealer or Microsoft. For more information: Microsoft, 10700 Northup Way, Bellevue, WA 98004; (206) 828-8080.

Q. Is the Apple II compatible with the Apple IIe?

A. John Morand, a technical support representative for Apple Computer and a member of the AppleSeed User's Group located in Worcester, Mass., says "over 95 percent of software and hardware is compatible between the II and the IIe." One of the few instances where software would not be compatible is when the software requires that a chip be added to the motherboard, says Morand, because the motherboards in the II and IIe are different.

Since some of the timing is different between the II and IIe, there are some peripherals which work with one model and not with the other. An obvious hardware difference between the two is that the IIe has more characters on its keyboard than the II. Some software is written to take advantage of the extra keys on the IIe.

Morand says Apple dealers generally have a complete listing of hardware and software compatibility for the different Apple systems.

Q. Will the Macintosh computer's 128k memory be expandable to 512k?

A. Yes, says Kathleen Dixon, corporate communications representative for Apple Computer. Macintoshes with 512k memory will be available, likely sometime in 1984, and owners of existing Macs will be

able to upgrade.

The company is waiting for 256k chips to become available at a reasonable cost in sufficient quantity. A board replacement with new 256k chips on it will then be available. There are no further details at this time about where they'll be sold or their price.

Q. I want to buy a personal computer but don't have a lot of money to spend. I see a number of computers advertised for just a few hundred dollars, while others claim to be "low-priced" systems for around \$2000. How much do I need to spend for a basic computer?

A. That's one of the most frequently asked questions of computer salespeople, says John Weingarten, assistant manager of Mission Computer Centers in Mountain View, California. The answer isn't easy.

You must first clearly define your use for a computer. Will it be used for business, education, recreation, or some combination of these activities? "If you foresee serious use for your computer, such as word processing, you will want a good keyboard with real typewriter keys," Weingarten says. "You will also want the display screen to give you 80 columns of text, so you can see on-screen how your document will appear on paper."

"Many inexpensive computers are missing one or another of these important features," he continues. "More to the point, perhaps, is the fact that many people who purchase one of these '\$300 computers' end up spending as much as they would have for a less limited machine. When you consider some of the 'extras' you'll need to add to your computer to make it more than just a toy, that \$300 computer can very quickly become a \$1000 to \$2000 system. Disk drives, monitors, adequate memory, an 80-column display, and future expandability are usually included

with computers at around \$2000."

It's understandable that first-time computer buyers often want to get their feet wet with a low-priced computer; they figure they can add on as their needs grow. But according to Weingarten, "Too many times, this first computer with its hundreds of dollars of add-ons ends up in a closet for lack of software, features, technical support and service. Sometimes, when you spend too little at first, it can cost you twice as much in the long run. Choose wisely and your computer will be a tool you can use for years to come."

Q. I've read that it is possible to convert a program to text file by listing it to disk on an Apple IIe computer. How do you do this and how do you reverse the procedure?

A. This procedure is outlined in the DOS reference manual, according to John Morand of the AppleSeed User's Group in Worcester, Massachusetts. To convert a program to a text file, you have to add six lines of code at the beginning of your program. Let's say you have a program that starts at line 10 and ends at line 100, and you want to name it "APROGRAM." Code these lines:

```
Line 1: DS = CHR$(4)
Line 2: PRINT DS; "OPEN APROGRAM"
Line 3: PRINT DS; "WRITE APROGRAM"
Line 4: LIST 10,100
Line 5: PRINT DS; "CLOSE APROGRAM"
Line 6: END
```

When you tell this new program to run, it will list your original program, contained in lines 10 to 100, to your disk as a text file.

Reversing the procedure is simpler. To convert a text file to an Applesoft program, type: EXEC (a space), the file name, then Return. The file will be loaded as if it were a program, and then the program will begin to exe-


cute one line at a time. As soon as you see something appear on the screen—which means the program is trying to execute—hit Control C to stop it. Then you can save the program as a BASIC file.

Q: The text produced on our monitor is very good when we use one word processing program, but extremely poor when we use another word processing program. What factors can cause such variation? I had thought the quality of the text depended on the type of monitor being used.

A: The quality of text on a monitor depends on a number of things: your monitor, your personal computer, the display board within your computer and your software.

In this case, it's clear the differences you see in text quality are caused by your software, since your other equipment remains the same. According to Linda Merrill of Apple's corporate communications department, the way software is written affects how the on-screen characters are formed. Most word processing programs use a character set for text that is built into the computer's ROM (read only memory). Such software uses a "character generating mode."

Some programs, however, generate their own character set with a character description written right into the program. The program is telling the computer where each dot should go on-screen. This is called bit-mapped graphic mode.

As a result, the text you end up with on your monitor can be drastically different depending on which way the software is written—even if everything else about your setup remains the same. In your case, perhaps one of your programs produces bit-mapped characters while the other uses a character generating mode. Or they both may have bit-mapped characters, but of disparate quality. 

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CIRCLE 243

Recent Arrivals From The Publishers

■ **Overcoming Computer Illiteracy** ■ **The First Book To Read About The IBM** ■ **Word Processing And Beyond** ■ **The Apple Macintosh Book**

Becoming An Expert

**OVERCOMING COMPUTER
ILLITERACY: A FRIENDLY
INTRODUCTION TO COMPUTERS**
SUSAN CURRAN AND RAY CURNOW
PENGUIN BOOKS
NEW YORK, NY
458 pp., \$12.95

If this book represents a friendly introduction to computers, I have no wish to see one that is hostile. This is a serious book that does not merely overcome computer illiteracy; it squelches that deficiency and leaves it gasping.

Don't be misled, however. Susan Curran and Ray Curnow have not produced a bad book. The 458 pages are packed with information, and the authors appear to know their subject. If you are a casual reader or computer novice, however, this book isn't for you. But if you find speech synthesis or uncommitted logic arrays engrossing, *Overcoming Computer Illiteracy* may be just what you've been looking for.

The authors literally start from square one with an exposition of binary arithmetic and an introduction to logic circuits. They progress through a history of computers, a description of modern computer technology, a roundup on programming and computer languages to some fancy applications such as weather forecasting

and expert systems. The writing is clear and the book is liberally illustrated with useful diagrams.

Incidentally, the authors are English and first published *Overcoming Computer Illiteracy* in the United Kingdom in 1983. This dates certain sections of the book—but not badly. However, there are some references to microprocessors and applications that may not be relevant to American readers. Nonetheless, for \$12.95, this book covers a lot of ground. I would recommend it to high school students who have a strong interest in computers, or as a background text for first-year computer science students.

—Jeffrey Bairstow

Help For IBM Users

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Whether you've just bought an IBM Personal Computer or are seriously considering the purchase of one, there are two basic questions you'll probably ask yourself: How am I going to get it set up? and, How am I going to get it to do what I want it to do?

Alas, your best friend isn't a com-

puter consultant who's willing to come over and hold your hand, and Charlie Chaplin isn't available. What you need is a book. But more than just any book, you need a good introductory volume written in clear, conversational English that explains every *even slightly* technical word as well as provides a complete glossary. A book that takes you one step at a time through the process of setting up the computer and getting the software you need up and running. You need a book like *The First Book to Read About the IBM Personal Computer*.

When I finished the first chapter of this book, I thought, "This is it!" Naiman talked about computers in a way that any neophyte could understand. All the words in a computer user's vocabulary were printed in bold face type and thoroughly explained. He even defined "software" and "hardware." "Great!" I thought. Chapter 2 even devoted two full pages to describing the "one short beep" you get when you turn on the machine. Now that's what I call complete.

But after Chapter 2 comes Chapter 3, in which Naiman introduces ... accounting software packages. And then I thought, "This is the next thing I need to know after learning how to turn the computer on?" The chapter continues with inventory and client scheduling programs. Somehow, it wasn't what I expected.

At times like this I'm reminded

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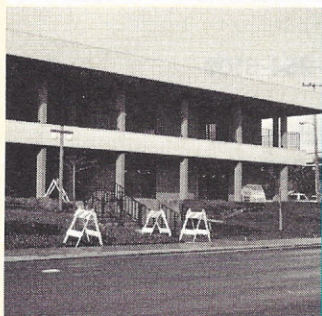
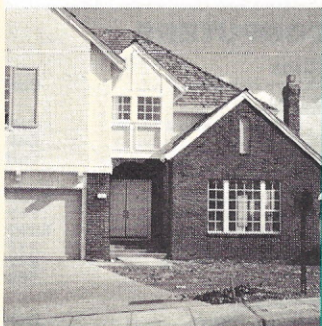
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CIRCLE 206

BOOK REVIEWS

that just about everyone with a word processing program and a printer has leaped into the fray of writing a book on personal computers. That's not to say that Arthur Naiman is not qualified to write his book—his other literary credits include two books on word processing—yet the best description he can come up with for what you can do with a word processing program's editor (in the chapter devoted to word processing) is that it "lets you enter and modify text on the screen." I think I'd expect a little more detail in a book touted as the first book I should read about the IBM Personal Computer.

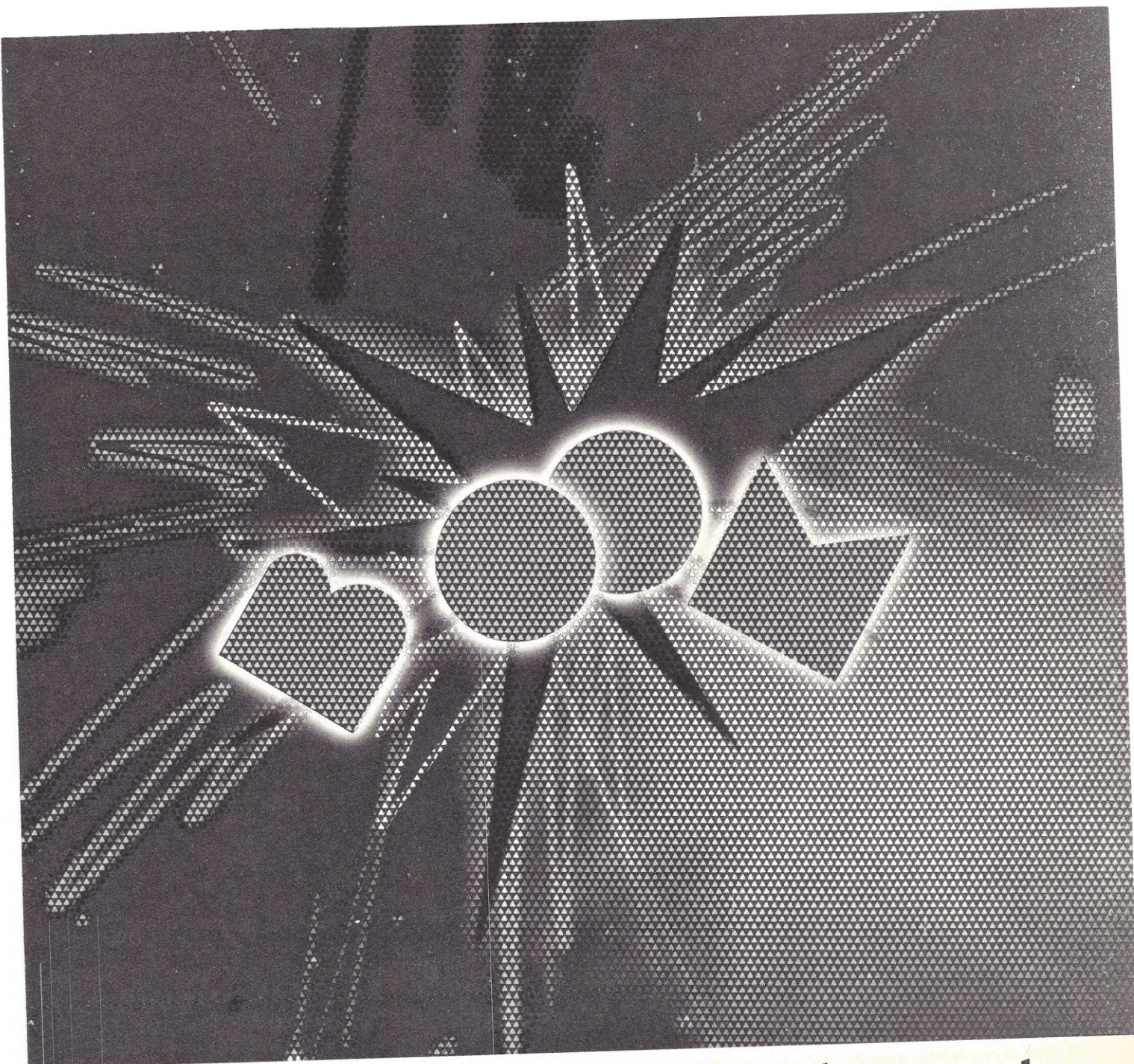
Beyond these first introductory chapters, the rest of the book is a list of software and hardware available for the IBM Personal Computer, with prices, addresses, and descriptions of each item that are sketchier than those in most magazine ads.

However, once you get over the idea that *The First Book to Read . . .* is not really a primer on using the IBM, you realize it still has merit in another area of concern to the new Personal Computer user: If you've decided to buy an IBM and are trying to budget your purchase, this is a good place to turn. Here you'll find all the hidden costs that aren't reflected in the "basic system" prices that you see advertised. For example, adding a disk drive to a system means adding the cost of the drive, the operating system, and a new version of BASIC.

Not only does Naiman give you a quick way to estimate the total real cost of your system, he also presents sample systems for writers, families, corporate executives, and small businessmen, complete with average costs.

If I were looking for a first book to read about the IBM Personal Computer, this would not be my ideal choice. But for helping you budget the total cost of the system you've picked out, it could be very useful.

—Orlan Cannon



Business Week readers knew about the computer war before the first shot was fired.

Back when most people were touting the boom in personal computers, people who read Business Week were looking ahead to the fireworks that would follow.

They knew price wars were on the way. There would be battles for shelf space. The struggle for more software would be hard fought. And they knew that few of the companies trying to cash in on the new industry would survive.

In fact, long before the computer war broke out, Business Week readers not only knew it was coming, but who would come out on top.

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CIRCLE 30



Meet The Mac

THE APPLE MACINTOSH BOOK

CARY LU
MICROSOFT PRESS
BELLEVUE, WA
383 pp., \$18.95

To say I was impressed when I first saw Apple's new Macintosh is an understatement. The Mac is such a radical step forward in personal computers that using it is like driving a BMW after driving a Model T Ford. One of the problems with this new machine is that, even today, it's difficult to get much information on it from Apple dealers other than some slick, glossy brochures. If you want to know more about the languages that will be available, future accessories or communications software, you can probably squeeze some vague answers from otherwise helpful Apple dealers—or you can read Cary Lu's book.

Let me give the endorsement now. If you have a Mac or are thinking about buying one, get this book. It is a veritable fountain of information about the Mac and its software. And the book is almost as much of a pleasure to read as the Mac is to use.

Lu, the microcomputer editor of *High Technology* magazine, is a man after my own heart. To the prospect of authoring a book about Apple's then secret computer, he first replied: "I had never heard of any microcomputer that was sufficiently interesting to write about." Under duress and, no doubt, the "threat" of making money, Lu went to the West Coast to see the nascent Macintosh and changed his mind immediately. Months before it was officially unveiled, Lu had access to the Mac team at Apple and its counterparts at Microsoft.

By now, *The Apple Macintosh Book* should be in local bookstores. Read it and enjoy. Not only does Lu provide a wealth of detail that simply

is not available elsewhere, but he presents his material in a readable fashion. As might be hoped for in a book about a computer with an exceptional visual interface, the illustrations are models of clarity. Even the typography is of an unusually high standard for a computer book.

The first of the book's four sections is a walk-through of opening up the carton and getting the Mac running. That much is already in Apple's excellent documentation, but it serves as a fine introduction to the Mac.

The second section deals with the basics of using a Mac and offers a lot of information on software packages that have been announced but are not yet available. There is a bias toward Microsoft packages, but that is to be expected in a book from Microsoft Press. However, there are approximately 250 registered software developers working on programs for the Mac, according to Apple.

For me, the last two sections were the real meat of the book. One deals with how the Mac works both in a stand-alone manner and in conjunction with various accessories. A chapter is also included comparing the Mac with the IBM Personal Computer. Although Lu is as dispassionate as possible, the message comes through that Mac stands out.

The final section is a kind of grab bag of fascinating topics that clearly intrigued Lu but did not have much of a common connecting link. He covers communications in great detail, something Apple has been uncharacteristically coy about. There's even a chapter on reproducing the Macintosh screen, an important matter for a computer with such terrific graphics.

A thorough reading of *The Apple Macintosh Book* finally convinced me that I should get a Mac. I ordered one, but they are in short supply in my area. If more people read this book, my guess is that the Macintosh will be in even shorter supply.

—Jeffrey Bairstow

A Way With Words

WORD PROCESSING AND BEYOND

FRED STERN
JOHN MUIR PUBLICATIONS
SANTA FE, NM
221 pp., \$9.95

Many more years ago than I care to remember, I encountered a book called *How to Keep Your Volkswagen Alive* by John Muir, an author who was depicted on the back cover of his book as a man with a parrot on his shoulder. A man of the 1960s, Muir recommended obtaining a three-legged stool before starting work on one's battered bug. You sat on the stool, read the relevant section of the book, and contemplated the "karma" of your VW before taking wrench in hand.

Muir built up a publishing mini-empire with a similar brand of entertaining—but useful—self-help books written by various authors, one of them being Fred Stern. Thus, I was prepared to have Stern's book put me in the lotus position before I sat down to write this review. Instead, the book is chatty but serious. I get the idea that Stern does not have a parrot on his shoulder when he works on his computer.

Even so, Stern has produced a perfectly acceptable introduction to computers in general, and word processing in particular. It's the kind of book I might give to new assistants in the office before letting them loose on their IBM Personal Computers. The book is a bit more readable than a manufacturer's manual, and it contains a lot of useful background information that a computer user ought to know.

However, unlike Muir's earlier auto guides, Stern's book stops short of naming names and giving the truly practical advice that could have added so much to this book.

—Jeffrey Bairstow



Why people choose an IBM PC in the first place is why people want IBM service...in the first place.

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CIRCLE 64

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called up the
home office!"

The exciting world of telecomputing. With a Hayes system, you just plug it in! Communicating is so easy with a complete telecomputing system from Hayes. Hayes Smartmodem 300™ is a direct-connect modem for the new Apple IIc. Hayes Micromodem IIe® installs easily in an expansion slot in the Apple II, IIe, III and Apple Plus. Packaged with Smartcom I™ companion software, both are complete systems. Best of all, both systems are from Hayes, the established telecomputing leader. Just plug in—and the world is your Apple!

We connect you to all the right places. Bulletin boards, databases, information services—naturally. And that's just the beginning. Let your Apple plan your travel itinerary, including flight numbers, hotel and rental car reservations. Watch it retrieve and analyze daily stock and options prices. Work at home and send reports to and from your office. You can even do your gift shopping by computer!

Would you care to see our menu? Make your selection. Really. With

Smartcom I, you just order up what you want to do. The program guides you along the way. You can create, list, name, send, receive, print or erase files right from the menu. From the very first time you use it, you'll find telecomputing with Hayes as easy as apple pie!

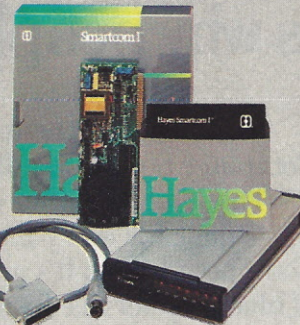
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CIRCLE 55

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SYSTEMS

SINCLAIR QL

Sinclair Research, long known for developing low-cost electronic products, has done it again with the introduction of the QL computer, a computer designed for serious professional use that carries a suggested retail price tag of only \$499. The computer, which is manufactured in England under subcontract by Thorn EMI Datatech, will be available in the U.S. market this fall, the company says.

The QL is built around the Motorola 68008 microprocessor, which is code-compatible with the 68000, the processor used in the Apple Lisa and Macintosh computers. But this processor has fewer address and data lines than the 68000, so it can address 1 Mbyte of memory directly, which is less than the address space available to the 68000. Never mind, 1Mbyte is a lot of memory.

The computer is housed in a unit that looks like a simple keyboard, and measures 5 $\frac{3}{4}$ " by 1 $\frac{3}{4}$ " by 18 $\frac{3}{4}$ ". The keyboard itself has a 65-key QWERTY pad, five function keys, two shift keys and four cursor-control keys. Inside the case is 128k of RAM, and two 100k "QL microdrives." These drives are not disk drives; they're wafer-tape units.

Also bundled with the computer are four software applications: QL Quill—a word processor; QL Abacus—a spreadsheet; QL Archive—a data base manager; and QL Easel—a graphics program. Sinclair says these programs are designed with a "pyramidal structure" that gets even inexperienced users up and running fast. As the user gains experience, he can gain control of and use more parameters easily. At any point in the program, a user can press function key 1 and get a display of a full help screen of relevant information. The software runs under a proprietary operating system called QL DOS that features single-user multitasking (the capability for one user to run more than one program simultaneously), display handling for multiple screen windows and device-independent input/output.

The Sinclair QL supports either monochrome or color graphics, but there's no monitor built in, so users will

have to provide one. A television set can be used as a monitor, or you can use a composite monitor or an RGB monitor, the company says. The computer has a number of peripheral ports beyond the monitor and TV ports. These are a microdrive expansion port, a ROM cartridge port, two serial ports, two local area networking ports, two joystick ports and a port for internal expansion.

MORE INFORMATION: Sinclair Research Ltd. USA, 50 Staniford St., Boston, MA 02114; (617) 742-4826.

Advanced Personal Computer III

This new NEC desktop runs both the MS-DOS and Unix operating systems. It uses a 16-bit processor and the clock speed is 8 MHz, according to NEC. A basic system comes with 128k of memory (expandable to 640k), one floppy drive, keyboard and monochrome monitor.

\$1995

NEC Information Systems, Inc.
1414 Massachusetts Ave.
Boxborough, MA 01719
(617) 264-8000
retail

CX Series

A line of portables, the CX Series from Franklin incorporates three operating systems and features Franklin's new Apple-compatible operating system. Models in the CX Series also support the MS-DOS and CP/M operating systems.

There are four models in the CX Series: CX-1, CX-2, CX-2C and CX-2M. The CX-1 and CX-2 run Apple II Plus software only, and have one and two disk drives respectively. The CX-2C runs Apple II Plus and CP/M software; the CX-2M runs Apple II Plus and MS-DOS software. Both have two disk drives.

\$1395 (for CX-1)

\$1695 (for CX-2)

\$1995 (for CX-2C)

\$2295 (for CX-2M)

Franklin Computer Corp.
1070 Busch Memorial Hwy.
Pennsauken, NJ 08110
(609) 488-0600
retail

Otrona 2001

The Otrona 2001 provides 100 percent

functional and operational compatibility with the IBM Personal Computer, according to Otrona.

With a weight of 19 pounds, the portable 2001 includes an internal 10Mbyte hard disk drive and an internal 1200-/300-baud modem. RAM is 128k and the computer has a 7" flat amber display.

\$2495

Otrona Advanced Systems Corp.
4725 Walnut St.
Boulder, CO 80301
(303) 444-8100
retail

TPC IIS

TPC IID

Both compatible with the IBM Personal Computer, the IIS and IID have 256k of RAM each, built-in serial and parallel ports and an IBM-compatible keyboard. Both produce 640 by 200 high resolution graphics. The IIS has one floppy drive, and the IID has two.

\$2395 (for IIS)

\$2695 (for IID)

TeleVideo Systems, Inc.
1170 Morse Ave.
Sunnyvale, CA 94086
(408) 745-7760
retail

PERIPHERALS

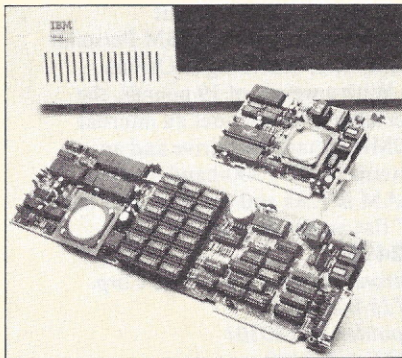
PERSONAL COMMUNICATOR MODEMS

Introduced recently by U.S. Robotics, Inc. of Chicago, Ill., the Personal Communicator auto-dial modems are designed for use with the IBM Personal Computer and XT, and transmit at 300 or 1200 baud. Two of the three models available add usable RAM, a real-time clock and a parallel interface.

Each of the three Personal Communicator models includes Telpac communications software which lets users program the modem's automatic functions.

Fitting into any available slot in the IBM Personal Computer or XT, the basic Personal Communicator unit is an auto-dial, auto-answer asynchronous modem board with automatic speed detect, audio phone-line monitor, volume control, programmable

PRODUCTS



Available in two different size models, the Personal Communicator modem boards fit any slot in the computer.

commands and two RJ11C jacks.

The two advanced models of the Personal Communicator modems add 64k and 256k of RAM. They also include a parallel port for connecting printers or other peripherals and feature a real-time clock with its own battery-backup system, which lets users program the units for automatic operation at preselected times.

U.S. Robotics took the smaller expansion board space of the IBM XT into consideration when designing the boards. The modem board alone measures just 4" by 6" and the modems that include RAM measure 4" by 13".

The Telpac software included with the modems lets users call other computers automatically or manually and remote terminals can enter the user's computer automatically. A user can devise a private password to prevent unauthorized entry into the system and create graphics.

Telpac stores an unlimited number of phone numbers which are dialed automatically at the user's command. Each number can be assigned different options, such as baud rate, full- or half-duplex and touch-tone or pulse dialing. A user can establish a log-on sequence for each number, including passwords, account numbers and other required commands. In addition, Telpac will automatically redial a busy number until a connection is made.

Telpac has four types of protocols, including "Modem" protocol and user-defined protocol. Automatic error detection is provided through parity checks and two types of block checks.

The basic Personal Communicator

unit retails for \$499. The model with 64k of RAM sells for \$699 and the 256k RAM model costs \$999.

FOR MORE INFORMATION: U.S. ROBOTICS, INC., 1123 W. Washington Blvd., Chicago, IL; (312) 733-0497.

Diablo 32CQI

Offering graphics capability in dot, line and block modes, the 32CQI correspondence-quality matrix printer provides character widths ranging from five to 16.6 characters per inch.

The 32CQI prints 132 columns at speeds up to 150 characters per second and uses a parallel interface.

\$995

Diablo Systems, Inc.

P.O. Box 5030

Fremont, CA 94537

(415) 498-7000

retail

Eagle Color Monitor

When used in conjunction with the color/graphics adapter board, the 13" color monitor provides 80 characters by 25 rows in text mode and color graphics with up to 16 foreground and background colors in graphics mode. The monitor has a resolution of 640 by 200 pixels in monochrome mode and 320 by 200 pixel resolution in color.

\$680

\$295 (for color/graphics adapter board)

Eagle Computer, Inc.

983 University Ave.

Los Gatos, CA 95030

(408) 399-4200

retail

Hercules Color Card

On the IBM XT, this card can be inserted into one of the short expansion slots, keeping the long slots free for full-size cards. The company says it is compatible with all color graphics software for the IBM color card. The Hercules card also features a parallel printer port, eliminating the need for another card to hook up a printer.

For IBM Personal Computer, XT

\$245

Hercules Computer Technology

2550 Ninth St.

Suite 210

Berkeley, CA 94710

(415) 540-6000

retail

Interface-32

A 16-digital input, 16-digital output interface board, the Interface-32 can be used for lab process control, data acquisition control, robotics experimentation and industrial control.

For Apple II, IIe

\$59.95

MicroDimensions, Inc.

30432 Euclid Ave.

Wickliffe, OH 44092

(216) 944-4200

retail

RAM+6

With options that allow users to add up to 384k of RAM, the RAM+6 multifunction card includes 64k of RAM, a clock/calendar with battery backup, a parallel printer port, an RS-232 serial port and a game port. Flash Disk and Flash Print software are included.

For IBM Personal Computer, XT

From \$395

Seattle Computer

1114 Industry Dr.

Seattle, WA 98188

(800) 426-8936

(206) 575-1830 (in Washington)

retail

RS-232-C Interface System

This free-standing unit allows the use of a printer and modem without the otherwise required expansion unit.

For TI 99/4A

\$99.95

Mikel Laboratories, Inc.

17360 S. Gramercy Pl.

Gardena, CA 90247

(213) 532-3029

direct order

Series 36 Printer

Designed to operate at 30 to 40 cps, the Series 36 daisywheel printer has an "All-Purpose Interface" which lets it hook up with RS-232-C, IEEE 488, and Centronics connections. There is also a 12-bit parallel interface available for it.

Features include drop-in printwheels and ribbon cartridges

\$1595

Diablo Systems, Inc.

24500 Industrial Blvd.

Hayward, CA 94545

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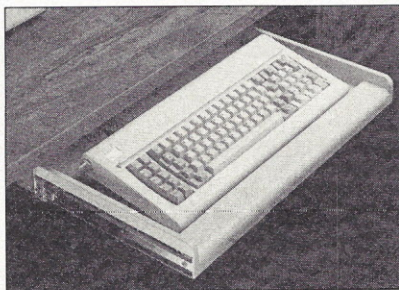
BITS AND PIECES

UNDER CARRIAGE KEYBOARD DRAWER

Personal computer owners or users whose systems have a detachable keyboard can take advantage of a new way to save desk space with the Under Carriage Keyboard Drawer from MicroComputer Accessories, Inc. of Culver City, California.

A cantilever drawer supported by ball-bearing slides, the Under Carriage Keyboard Drawer can be easily installed and fastened under a desk top, shelf or table top, according to the company.

The drawer holds a keyboard with



Holding a detachable keyboard, the Under Carriage Keyboard Drawer slides out and locks into place.

dimensions up to 2 $\frac{3}{4}$ " high by 20 $\frac{1}{2}$ " wide by 9 $\frac{1}{2}$ " deep and extends to a locked position for typing. It requires a 3 $\frac{1}{4}$ " by 21" clearance and can handle keyboards the size of the IBM Personal Computer, for example.

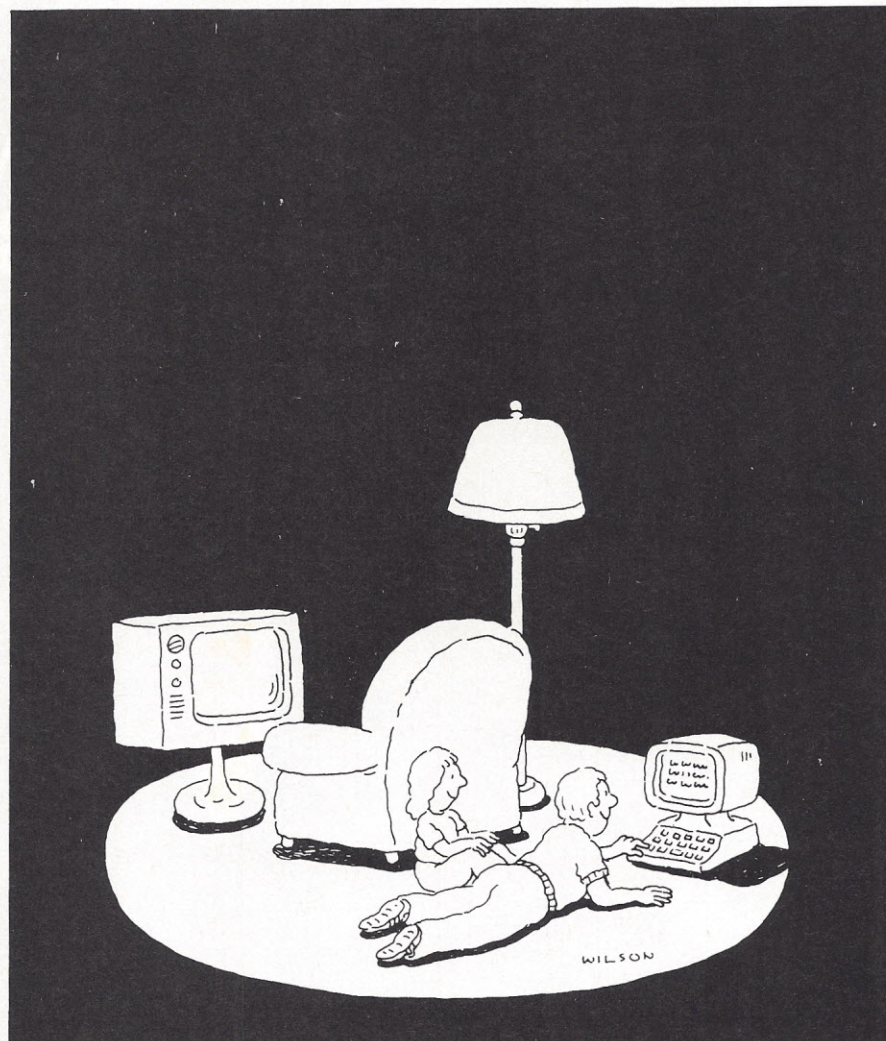
When not extended, the platform drawer acts as an accessory by positioning the keyboard directly underneath the desk out of the way.

Available in two colors, putty or black, the Under Carriage Keyboard Drawer carries a suggested retail price of \$54 and is available from MicroComputer Accessories.

FOR MORE INFORMATION:
MICROCOMPUTER ACCESSORIES, INC.,
5721 Buckingham Pkwy., Culver City,
CA 90230; (213) 641-1800.

Ape-Link

An expansion cable, Ape-Link features either two or three Atari serial peripheral input/output



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CIRCLE 212

August 1984 PERSONAL COMPUTING 167

"Thoughtware, How Can I Become A More Effective Leader?"



Thoughtware is new, easy-to-use software that will help you see and understand how to become a better manager. It's a unique series of personal, computer-based management diagnostic and training programs.

® Thoughtware is a registered trademark of the Institute for Management Improvement.

How can you become a more effective leader? Thoughtware Program 2.1, "Leading Effectively," will tell you. This four part program has been designed to help managers improve their effectiveness as leaders. It gives you an opportunity to assess your own management style and to compare your results to the self-assessments of other managers.

Unit 1 defines leadership and discusses its three key elements—style, situation and strategy. It stresses the importance of matching the leadership style to the situation and of getting and giving feedback.

Unit 2 is designed to improve your leadership style

and increase your ability to perform more effectively. You will see the difference between the kinds of power you exert and the importance of using your influence to affect the behavior of others. You'll also learn about three factors affecting your leadership style: the assumptions you make about people, the degree to which you are task- or people-oriented, and the attitudes you have about the competence of those you supervise.

Unit 3 asks you to analyze a leadership situation you currently face in order to determine what style

of leadership is appropriate for your particular situation.

Unit 4 offers guidance on how to use eight effective leadership conditions.

To take advantage of the incredible new technology that is Thoughtware, see the adjacent column.

*Thoughtware Programs run on the following:
IBM® PC and compatibles
with color graphics card.
Apple® II Plus and IIe.*



CIRCLE 63

Expanding The Universe Of Learning.

Thoughtware Is The Future.

It's a new way to learn, a logical and innovative approach to management training. It will revolutionize management training now, and in the future. Thoughtware utilizes the latest research in management development from leaders in the field, and has been tested nationally.

For individuals, and their organizations, the educational, economic and operational benefits of Thoughtware's computer-based learning programs are enormous. But Thoughtware isn't just the future.

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Some of the corporations and organizations who have purchased Thoughtware's Assessing Personal Management Skills Program include:

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| Dow Jones | Royal Cup Coffee |
| Dun & Bradstreet | Sentry Insurance |
| DuPont | Singapore Embassy |
| Ernst & Whinney | Stone & Webster |
| Exxon | St. Regis Paper |
| Federal Reserve Bank | Tampax |
| Fireman's Fund | The Nestle Co. |
| General Electric | The Rouse Co. |
| General Foods | 3M Corporation |
| Georgia-Pacific | TRW |
| Gov't of Canada | Univ. of Illinois |
| Gulf Oil Corporation | United Parcel Service |
| Hewlett Packard | United Way |
| Horn & Hardart | Univ. of Mass. |
| Hughes Aircraft Co. | Westmoreland Coal |
| Husky Oil | Westinghouse Corp. |
| IBM | Xerox |

And hundreds more. What they've learned, you can now discover.

You can reap the benefits of Thoughtware by visiting your local IBM Product Center, computer dealer, or call toll-free 1-800-THT-WARE for the dealer nearest you. Or write:

Thoughtware Inc.
Suite C, 2699 So. Bayshore Dr.
Coconut Grove, Florida 33133.

Thoughtware Programs include:

- 1.1 Assessing Personal Management Skills (\$350)
- 2.3 Defining Goals And Objectives (\$450)
- 2.6 Managing Time Effectively (\$450)

connectors with a six-foot cable.

For Atari 400, 800, 1200XL

\$39.95

Digital Devices Corp.

430 Tenth St.

Suite N 205

Atlanta, GA 30318

(404) 872-4430

retail

Caretaker

Caretaker lets you share one peripheral between several computers. It hooks up by cable to the peripheral and the computers and when your computer requests the peripheral, Caretaker automatically connects it if the peripheral is available.

\$200 (for first two ports; \$50 each additional two ports)

Rose Electronics

P.O. Box 742571

Houston, TX 77274

(713) 240-7673

direct order

Com 275

Featuring waterproof material, this computer bag has two types of interior padding, including a high-impact foam. It measures 18" by 17½" by 12" and is available in black, smoke and rust colors.

\$129

Kiwi, Northern Merchantile, Inc.

6721 N.W. 36th Ave.

Miami, FL 33147

retail

Competition Pro 5000

One of four joysticks introduced at CES, the 5000 has large, dual-fire buttons for right- or left-handed operation and a textured knob molded onto a steel shaft.

\$17.95

Coin Controls, Inc.

2609 Greenleaf Ave.

Elk Grove Village, IL 60007

(800) 323-8174

retail

Computer Deskmate

With a top base unit that rides on ball bearings, Computer Deskmate can support any personal computer having a remote keyboard.

\$129.95 (plus shipping)

Comp-Craft, Inc.

PRODUCTS

P.O. Box 21607

Milwaukee, WI 53221

direct order

Lintek Monitor Mover

Desk-mounted, this adjustable mechanical arm holds most computer displays up and off the user's desk.

The Monitor Mover consists of a desk clamp, a 360-degree swivel base, a 15" vertically adjustable arm and an individualized CRT mounting tray that swivels and can be tilted 15 degrees.

\$149.95

LinTek

P.O. Box 8056

Grand Rapids, MI 49508

(616) 241-4040

retail

BUSINESS

PLEASE

Hayes Microcomputer Products, makers of the Hayes series of modems, has entered the software market with Please, a data management system for the IBM Personal Computer and compatibles.

Designed to make organizing information easier by simplifying data input and output, Please is a menu-driven program which features capacities of 999 characters per field, 99 fields per record, 2000 characters per record and several million records per data base—depending on the computer system's memory capacity.

When entering data, Please allows you the option of setting your own screen formats and field characteristics. Information from other data base products, word processing files or spreadsheets can also be integrated into Please. Output can be shaped from within four different designs—list, form, replacement and export—to meet specific needs.

The structure of your Please data base can be changed, data bases can be merged and copied, and data can be transferred within the system. Other Please features include the import/export data transfer which

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| Tax Advantage | 59.95 | 36.95 | SIERRA ON-LINE | | |
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| LOTUS | | | Multimate | 495 | 310.00 |
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| MICROPRO | | | Supercalc II | 295 | 295.00 |
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8868 CLAIREMONT MESA BLVD., SAN DIEGO, CALIFORNIA 92123

CIRCLE 202

PRODUCTS

moves information to and from Please and other popular application programs, password protection and an automatic dialing feature using a Hayes Smartmodem and a phone number from within a data base record.

Application templates, a predefined data base system, will also be available to help meet common data management needs. The templates include Mailing List, Membership, Applicants, Contacts, Appointments, Employee Files, Household Records and others.

Please, which requires 128k and two disk drives or a hard disk, retails for \$349. Application templates cost \$29.95 each.

FOR MORE INFORMATION: HAYES MICROCOMPUTER PRODUCTS, INC., 5923 Peachtree Industrial Blvd., Norcross, GA 30092; (404) 449-8791.

The Business Letter Library

The Business Letter Library is a collection of hundreds of model business letters for use with a word processing program (ASCII files). It features a variety of business form letters, including letters for sales, acknowledgements, memos, complaint letters, thank you notes, credit or collection letters and others.

For Apple II series; IBM Personal Computer, XT, PCjr
\$99.95

Delta Point Corp.
711 W. 17th St., B-10
Costa Mesa, CA 92627
(714) 642-1827
retail

Commtrader

Commtrader is designed to provide a real-time price quotation service with automatic transfer of data from memory to disk storage, automatic updates and a variety of graphic features.

For IBM Personal Computer
\$1500 (\$125 leased)
Market Data Systems
3835 Lamar Ave.
Memphis, TN 38118
(800) 434-4413
direct order

dBASE III

A relational data base management

program for 16-bit and larger computers, dBASE III is a follow-up to the popular dBASE II data base package. The dBASE III program is designed to maintain the features of dBASE II while adding greater data base capabilities, storage and speed. A command assistant mode called dBASE Assistant has also been added for the first-time user.

For IBM Personal Computer, XT (256k, two disk drives), all compatibles

\$695

Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570
retail

Decisions...Decisions

A decision-making aid, this package uses prompts, help screens and analysis to provide assistance in making a logical choice among several alternatives.

For all Atari
\$37.50
Lateral Software
P.O. Box 605
Stanton, CA 90680
(714) 826-3970
direct order

File Manager

File Manager lets you set up a data file and then organize, use and retrieve information according to your needs.

For NEC PC-8201A, TRS-80 Model 100
\$99.95

American Micro Products, Inc.
705 N. Bowser
Richardson, TX 75081
(214) 238-1815
direct order

Filepro 16

Filepro 16 is a data base that has relational capabilities and features large data capacity with the number of files limited only by disk space. For IBM Personal Computer, XT; MS-DOS-based systems (256k and hard disk)

\$495

The Small Computer Company, Inc.
230 W. 41st St.
Suite 1200

New York, NY 10036
(212) 398-9290
retail or direct order

Framework

Framework is an integrated package consisting of word processing, spreadsheet, business graphics, data management, forms processing and an outline generator. The program also offers linking capability with dBASE II, Lotus 1-2-3 and other ASCII files. For IBM Personal Computer
\$695

Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570
retail

FriendlyWriter

FriendlyWriter, a word processing program that comes with a 70,000-word spelling checker called FriendlySpeller, is designed for either business or personal use. The program features one keystroke operation, on-screen formatting and complete searching and copying features. For Columbia; Compaq; Corona; Eagle Spirit; IBM Personal Computer, XT, PCjr

\$69.95

FriendlySoft, Inc.
3638 W. Pioneer Pkwy.
Arlington, TX 76013
(817) 277-9378
direct order

General Ledger System

Designed for business users with little accounting experience, this program determines debits and credits for transactions and has a fixed asset management system to compute depreciation.

For the IBM Personal Computer, most CP/M-80-based systems

\$385

Eagle Enterprises
2375 Bush St.
San Francisco, CA 94115
(415) 346-1249
retail or direct order

IMS-Calc

IMS-Calc is designed to let the user create personal applications without programming through the workings of SuperCalc 3, an integrated electronic

Each week it's helping over 1,000 Accounting Departments to work smarter and faster.

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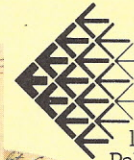
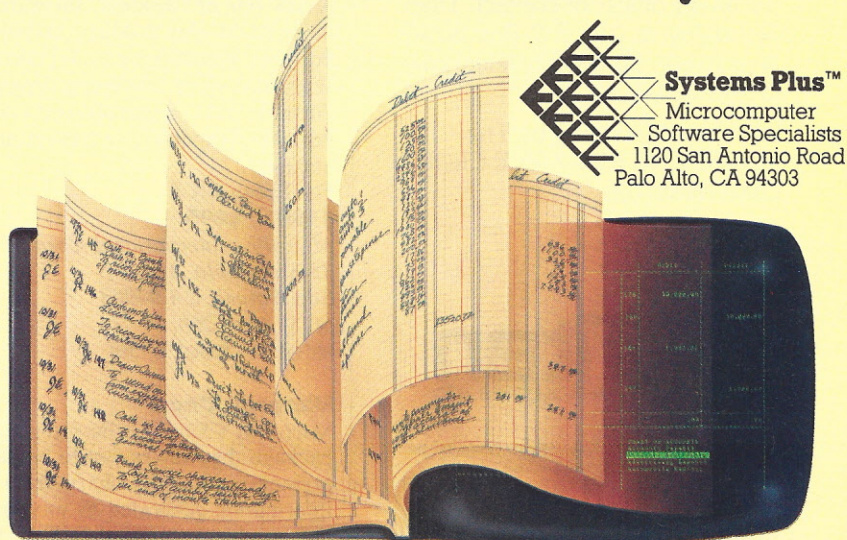
There are four optional modules to extend your accounting capabilities even further: Budgeting, Recurring Entries, Invoice Printing and Checkwriting. And more will be available soon.

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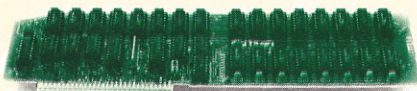
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CIRCLE 247

How To Expand Your Apple

Only Titan's Neptune™ provides Apple IIe users with an 80-column video display and up to 192K memory—all in just one slot.

Now, Titan's exclusive Neptune extended 80-column card gives you increased video display and up to 192K memory using just one slot in your Apple IIe. Designed expressly for the auxiliary slot of the IIe, the Neptune is available with 64K, 128K or 192K of RAM memory. The RAM memory can be



utilized as a solid state RAM disk. Additionally, Titan's VC-EXPAND/80™ software supplied with each Neptune expands VisiCalc® up to 220K of workspace memory and provides many other VisiCalc enhancements. DOS, PASCAL and CP/M® PSEUDO-DISK™ patches and a DOS relocation program are also included with each Neptune card.

Let us help you expand your Apple's productivity. For information on the Neptune and other Titan microcomputer products, see your computer dealer or contact: Titan Technologies, Inc., P.O. Box 8050, Ann Arbor, MI 48107; Telephone (313) 973-8422.

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CIRCLE 230

PRODUCTS

spreadsheet program.

For IBM Personal Computer, XT
\$250

Genie Systems, Inc.
49 S. Baldwin Ave.
Suite D
Sierra Madre, CA 91024
(818) 355-3303
retail or direct order

McPic!

McPic! is a library of 130 pictures created by professional artists that can be used as is or customized into a MacWrite or MacPaint file.

For Apple Macintosh

\$49.95

Magnum Software
21115 Devonshire St.
Suite 337
Chatsworth, CA 91311
(818) 700-0510
direct order

MegaMerge

MegaMerge is a mail-merging program designed to work with the MacWrite word processing package to produce form letters, mailing lists and labels.

For Apple Macintosh

\$125

Megahaus Corp.
5703 Oberlin Dr.
San Diego, CA 92121
(619) 450-1230
retail

MicroPro Portable Software

A new line of "diskless" software, the three ROM chip products include: Portable WordStar, an adaption of the WordStar word processing program; Portable Calc, a spreadsheet; and Portable Scheduler, an appointment manager.

For Epson PX-8

\$195 to \$495

MicroPro International Corp.
33 San Pablo Ave.
San Rafael, CA 94903
(415) 499-1200
retail or direct order

Microsoft Chart

Microsoft Chart is a business graphics package that allows you to prepare presentation-quality charts from information generated by any program that produces standard DIF or ASCII

files. The program presents you with graphic examples of different chart formats on the screen in a visual "gallery" from which you select a format.

For Apple Macintosh, IBM Personal Computer

\$250

Microsoft Corp.
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
retail

Microsoft Project

Microsoft Project is designed to let the general business manager plan schedules, assign resources and develop cost budgets for large or small projects. Project also provides advanced features for monitoring schedules and project overtime.

For IBM Personal Computer

\$250

Microsoft Corp.
10700 Northup Way
Bellevue, WA 98004
(206) 828-8080
retail

R Word

Billed as an advanced word processing package, R Word is a word and file processing system similar to the package of the same name for larger computers.

For IBM Personal Computer, TI Professional

\$395

R Systems, Inc.
11450 Pagemill Rd.
Dallas, TX 75243
(214) 343-9188
retail or direct order

Set-FX+

Set-FX+, designed to work with all Epson printers, allows you to select print modes, produce special character sets and custom fonts, and rotate document printing 90 degrees.

For Compaq; IBM Personal Computer, XT, PCjr

\$59.95

SoftStyle, Inc.
7192 Kalanianaʻole Hwy.
Suite 205
Honolulu, HI 96825
(800) 367-5600
retail

Simply Perfect

Simply Perfect is an integrated package of word processor, spell checker, calculating data base and reports generator.

For Apple IIe, IIc

\$189.95

Hilleman House, Inc.

Opus 2 Office Park

10237 Yellow Circle Dr.

Minnetonka, MN 55343

(612) 933-2460

direct order

Software 16 Accounting

Designed for small business, Software 16 Accounting consists of six separate modules: accounts receivable, accounts payable, inventory management, sales order, payroll and general ledger.

For IBM Personal Computer, XT;

DEC Rainbow 100; Wang

Professional

\$795

Softtran Corp.

153 Pierrepont St.

Brooklyn, NY 11201

(212) 875-0045

retail or direct order

Talking TermExec

A version of the TermExec communications package designed primarily for the visually impaired, this program works with a speech synthesizer to "talk" any words it receives on-line.

For Apple II series

\$79.95

Exec Software, Inc.

201 Waltham St.

Lexington, MA 02173

(617) 862-3170

retail or direct order

Wall Street Window

Wall Street Window is designed to combine technical stock analysis and portfolio management, using data base communications, color graphic displays and printout and spreadsheet interface.

For IBM Personal Computer (192k, color graphics card, two disk drives.

\$395

R&D Software

P.O. Box 2727

Reston, VA 22090

(703) 476-6597

retail

EDUCATION

DLM PRESCHOOL PROGRAMS

Three new early childhood educational programs, Alphabet Circus, Number Farm, and Shape and Color Rodeo, are now available from DLM Teaching Resources for the Apple II series.

Each program uses an animated character—a circus ringmaster, farmer or cowgirl—that provides prompts to help identify the correct answers and give feedback and reinforcement during the course of the program.

Alphabet Circus combines circus sounds and tunes with colorful graphics while allowing youngsters to explore the alphabet. The six different sequenced activities—Meet the Circus, Lost Letter, Alphabet Parade, Secret Letter, Juggler and Marquee Maker—are designed to help acquaint children with alphabetical order, letter recognition and text creation.

Number Farm is designed to teach number concepts, recognition of numerals and number words, and numerical order. Farm songs, animal sounds and color graphics complement the learning exercises which include Old MacDonald, Hen House, Animal Quackers, Horseshoes and Crop Count.

Shape and Color Rodeo is aimed at helping preschoolers learn shape and color recognition, identify classification and sharpen visual perception. The learning activities are Color Mix and Match I & II, Rope Trick, Shape Roundup, Cowhand Brand and Rodeo Flags. Sound and color graphics are used in each of the activities.

"We know from our years of experience as a developer of instructional materials that children quickly outgrow and become bored with materials that are limited to simple recognition skills," says Mario Campanaro, DLM's vice-president of marketing. "Each of our early education programs are developmentally sequenced so they grow with the child."

The six separate learning activities in each of the new DLM programs

are presented in order of learning difficulty. The first level is a preliminary exercise, the subsequent activities focus on a specific skill relative to that subject area and the final activity is designed to tie the previous lessons together.

Alphabet Circus, Number Farm, and Shape and Color Rodeo retail for \$29.95 each.

FOR MORE INFORMATION: DLM TEACHING RESOURCES, One DLM Park, Allen, TX 75002; (214) 248-6300.

AEC Spelling

Designed specifically for home use, AEC Spelling parallels the kind of spelling instruction given in schools to teach proper skills to students in grades 2 through 8.

For Apple II series; all Atari;

Commodore 64; IBM Personal

Computer, PCjr; TRS-80 Color

Computer

\$39.95

American Educational Computer
Software

2450 Embarcadero Way

Palo Alto, CA 94303

(415) 494-2021

retail or direct order

Algebra Plus

Algebra Plus provides interactive review and practice of vocabulary, concepts and problems for real number systems, equations, formulas, graphing, polynomials, factoring and word problems for high school students.

For IBM Personal Computer (color graphics card), PCjr

\$69.95

Microglyph

P.O. Box 37110

Albuquerque, NM 87176

direct order

The Chemistry Tutor

The Chemistry Tutor is designed to teach the essential skills of introductory chemistry while working on a variety of levels.

For Apple II series

\$25

John Wiley & Sons

605 3rd Ave.

New York, NY 10158

(212) 850-6336

direct order

PRODUCTS

Childpace

Aimed at parents of children from ages 3 months to 5 years, Childpace is a child development evaluation program that is designed to help track growth areas like coordination, language and personal/social skills. For Apple II series; Atari 800; IBM Personal Computer, PCjr; TRS-80 Color Computer

\$39.95

Computerose, Inc.
2012 E. Randol Mill
Suite 223
Arlington, TX 76011
(817) 277-9153
retail

Color Learning

Color Learning consists of four interactive games designed to teach the identification and

matching of colors.

For Apple II Plus, IIe

\$29.95

S. A. Software and The Child Center
10611 Tenbrook Dr.
Silver Spring, MD 20901
direct order

High School Skills Math Instructional Series

Containing eight math programs for grades 9 through 12, this series includes topics like basic number ideas, math sentences, geometry and measurement.

For IBM Personal Computer

\$69.95

Control Data Corp.
8100 34th Ave. S.
Bloomington, MN 55420
(612) 853-8100
retail or direct order

Math School

An arithmetic drill program, Math School has three difficulty levels to work with grade school and junior high school students.

For IBM Personal Computer, XT, PCjr, Portable

\$15

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50 MISSION CRUSH

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50 Mission Crush is available for the Apple II series, all Atari and Commodore 64. It retails for \$39.95.
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GEMS OF WISDOM

How Much Memory?

I own a Commodore VIC 20 with a 3k Superexpander cartridge. Conservation of memory is very important when you only have about 6k to work with, so whenever I create a program that might use up a lot of memory, I always keep track of it with the PRINT FRE (0) command.

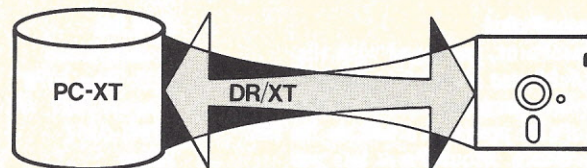
While I was working on a certain program, I checked to see how much memory I had left to work with. I had 3219 bytes. But as I continued, I ran the program and was stunned to find that I was out of memory when I had added only about 500 bytes worth, and should have had well over 2k of free memory. I erased my additions and experimented with it to see what went wrong. I discovered this: If the program incorporates Superexpander graphics and text, and if the program is stopped in the text mode, the VIC will only give the memory used for the text. However, if it's stopped in the graphics mode, it gives the correct amount of memory.

Grayson Towler
BEVERLY HILLS, CA

This Gem of Wisdom wins \$25 for Grayson Towler. If you have an anecdote, tip, or secret to share, send it (up to 250 words) to Gems of Wisdom Editor, Personal Computing, 10 Mulholland Dr., Hasbrouck Heights, NJ 07604.

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CORRECTION

On page 117 of the July issue, the illustration credit was inadvertently omitted. The credit should have read "Sculpture by Ajin, Photographed by Roberto Brosan." We regret the error.

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Software That Teaches Gets Down To Business

New "teaching software" packages address the needs of business professionals

by Philip Chandler

As personal computers become commonplace in more and more corporations, the need for a fast and efficient way of teaching professionals how to use them is becoming acute. The desire of companies and individuals to tap the productive powers of computing has been short circuited by the difficulty in learning the ins and outs of applications software. Busy executives are the ones who can perhaps most benefit from personal computer applications. Yet, by definition, they are the ones with the least time to find out how.

The problem is not a shortage of software. There is plenty of it, almost an embarrassment of riches. It is more a matter of matching an appropriate software package to each professional's needs or, in many cases, simply selecting relevant parts of a given software package and then finding an efficient teaching approach.

To fill this need, a number of software companies have begun to provide packages which are not ends in themselves, but means to teach professionals how to use other programs. The hallmark of this new "teaching software" is that it is very easy to use. If it were not, the problem would not be solved.

Sarah Adams, information center consultant at Intel Corp., in Phoenix,

Philip Chandler is a specialist on technology assessment.

Ariz., tells a typical story. Since Intel purchased Cdex training tutorials for DOS, VisiCalc and WordStar more than a year ago, managers have begun to make much better use of their IBM Personal Computers. "These self-paced training programs are an excellent means to learn the operations of the IBM Personal Computer and the major software packages we use here," Adams says. "The content, graphics, clear instructions and exercises all add up to a well-designed, informative training course."

Yale Dolginow, a retailing entrepreneur in Edina, Minn., turned to computer-aided instruction (CAI) to solve a specific problem. Two years ago, he bought an Apple II Plus and VisiCalc. Until very recently, however, his copy of this highly touted software remained unused. Why? "As an owner of 17 stores, I just didn't have time to work through the manual," says Dolginow. "But then I found out about the Cdex VisiCalc tutorial software. I can now program and use VisiCalc. I am really excited!"

Cdex is just one of a growing number of software suppliers whose products use the strategy of letting the computer itself teach managers to become computer literate. Why is this strategy so effective? Partly because tutorial-type software is more efficient than manuals in moving novice computer users into working relationships with their end-use programs.

But there may be a deeper reason.

Dr. John H. Gibbons, director of the Congressional Office of Technology Assessment, thinks that as the information revolution is making new demands on education, so new information technologies are affording unprecedented opportunities for meeting those demands. "The so-called information revolution is profoundly affecting American education," Gibbons says. "It is changing the nature of what needs to be learned, who needs to learn it, who will provide it and how it will be provided and paid for." According to Gibbons, the information revolution has enormous potential. "Information technology can potentially improve and enrich the educational services that traditional educational institutions provide, distribute education and training into new environments such as the home and office, reach new clients such as handicapped or homebound persons, and teach job-related skills in the use of technology."

Paving the way

Savvy managers want to be part of the expanding possibilities of the information age and computer-aided instruction is helping pave the way. According to Roselinde Torres, CAI trainer for Connecticut Mutual Life, there is no lack of motivation for decision-makers to become accomplished personal computer users.

A number of companies provide packages which are not ends in themselves, but means of teaching how to use other programs.

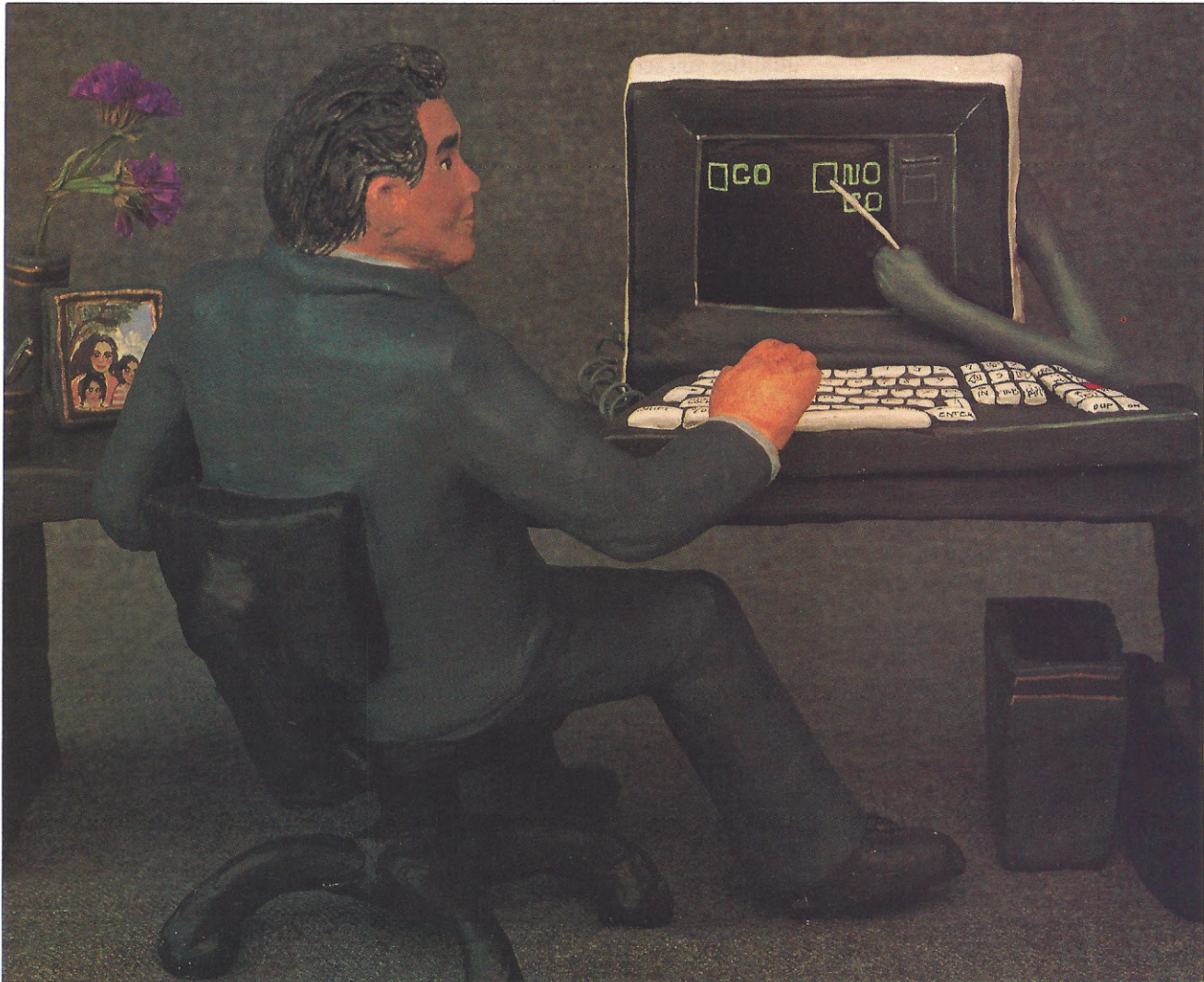


Illustration by Brookie Maxwell

"Everybody wants to learn. The only problem is finding the time," says Torres. "Managers are impatient with flipping through pages of a manual and the tutorial programs have the added advantage of simulating the operation of the programs that managers will actually use in their work."

Comparison with texts or manuals reveals another important point. Learning with computers is more fun. Fred Haskett, corporate trainer for Panhandle Eastern Corp., puts it this way: "For contemporary Americans, TV is the reality, not books. We are visually-oriented, so it is not surprising that people enjoy learning from

well-designed computer programs." Traditional resources such as books, television programs and recordings are essentially passive and cannot be tailored to meet individual needs. CAI is interactive and oriented to the individual.

Because computers can process information rapidly, they can also assist the corporate training department or the individual himself in diagnosing problems and in developing creative approaches to remedy them. And this is the point where a new and exciting kind of software is beginning to make its presence felt. Where Cdex software and the like teaches users to use

other task-oriented software programs, other companies, particularly Thoughtware and Human Edge, are producing programs which, in different ways, are giving managers fresh insight into their performance and how to improve it.

Human Edge has already put out two programs, The Management Edge and The Sales Edge, that have begun to make a difference in how some professionals approach their work. Another soon-to-be-released program, The Negotiation Edge, will round out the picture. Like all successful educational software, these programs from Human Edge are

highly interactive. Unlike most others, however, these are designed for use as a decision tool.

The Management Edge hits you where you live, according to aerospace manager Ray Williams, an executive who was looking for a way to boost morale and efficiency among his subordinates. "The Management Edge forces you to confront your actual practices," Williams notes. "You cannot make any real improvement in your managing skills unless you know your own strengths and weaknesses."

Self-assessment

The Management Edge is set up to give printed or CRT-display reports on your assessments of superiors, subordinates, your own managerial skills and your organization. But in order to obtain these reports, you have to complete a self-assessment first. The software is designed to store only one "Assessing Yourself" file at a time. When this self-assessment is complete, you can turn to assessments of superiors and subordinates; a number of files on different individuals may be stored. These storable files may be updated as your perceptions change.

"What makes the assessment reports really valuable is that they provide action items," says Williams. "Since the report of my assessment of a subordinate is composed in relation to my assessment of myself, it gives me concrete guidance on how interactions may be improved by changes in my behavior patterns. Essentially, these reports help me identify those areas where I can become more effective with specific people by making specific changes." In other words, the strong point of The Management Edge is that it avoids the windy generalizations by focusing on real-world situations.

The strategy of The Sales Edge is similar. First, you complete a self-assessment. Then you assess one or more customers. After that, the program is ready to provide you with Sales Stra-

tegy Reports. Each report is tailored specifically to the interaction of the qualities you see in yourself and those you see in that particular customer. The result helps you to craft your sales approach to each customer in a way that is more likely to lead to success.

Courtland Lewis, a Washington-based engineering consultant, makes use of a number of sales techniques. "The Sales Edge has helped me focus my attention on aspects of my relationships with my clients that I tend to ignore," Lewis claims. "As a result of my experience with The Sales Edge, I

To improve your management skills you must know your strengths and weaknesses.

have made changes in my approach to clients to make it more effective. We both learn, more efficiently and accurately, whether—and if so, how—the services I provide can be of use to a potential client. Even if there is no immediate match, the good will resulting from an effective approach is likely to lead to future business with that client or to a referral to another client who can use my services now."

Both The Management Edge and The Sales Edge are growth-oriented. As the user becomes better at managing or selling, his self-evaluation will become more positive and this, in turn, will lead to further refinements in strategies for dealing with others. The practical guidance offered by the interactive software is supported by very readable, succinct theoretical discussions of management and selling. Although to get the most profit out of these programs, you should read the theory, it is not necessary to do so. The software itself is not only easy to use but also perfectly capable

of sustaining your interest on a "let's get results" basis.

A different approach

Thoughtware takes a rather different, perhaps more reflective approach. This company has produced a series of 10 management training software packages, from Assessing Personnel Management Skills, through Motivating to Achieve Results, to Conducting Successful Meetings. There are snippets of management theory scattered throughout the software and the manual, but there is no single discussion in one section of the manual. Instead, each manual contains a section listing references for each of the topics covered.

Unlike the Human Edge packages which confine themselves to yes or no choices in the assessments and to detailed text in the reports, the Thoughtware packages make extensive use of graphics, both in the software and in the dot-matrix printouts. This kind of display makes you stop and think about the meaning of each of your responses, rather than hurrying you on to make the next one. The Thoughtware manuals are integral parts of successfully completing the program—not because the software is so difficult to use that you have to keep referring to documentation, but because the manuals contain written exercises keyed to the software.

Dennis Gutman, a trainer in the data processing department of the Bank of Boston, tested the first Thoughtware package with a group of six data processing managers. He was impressed enough to purchase additional packages. Gutman, a former teacher, thinks that Thoughtware provides "not only quality subject matter, but also a scintillating sensory experience." Compared with the presentation in a standard textbook, the Thoughtware computer presentation is more interesting and colorful. "The sensory feedback tends to hold your attention," Gutman says.

Nevertheless, Gutman does not

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think that any computer program is an adequate substitute for a human being. "Even with the sophisticated Thoughtware programs, there is a relative lack of feedback compared with what a good human teacher can provide." As a result, he insists that the Thoughtware programs be seen not as ends in themselves but as preliminary means for opening people's eyes to management issues that are then discussed in depth in small group meetings. "Many managers have come up through the technical ranks and do not have MBAs," says Guttman. "These people may not have given much thought to questions of motivation, leadership and communication. Programs like the Thoughtware packages can bring these ideas into consciousness very effectively and in a way that is not threatening to computer users."

As commercially available software that teaches continues to prove its worth and expand its range of subject matter, a complementary tendency has also been set in motion. A number of corporations have begun to develop training software specifically designed for their own employees, much of it proprietary. According to Connecticut Mutual's Torres, for example, some of the less well known features of Lotus 1-2-3 have been explored by her firm and proprietary software has been written in-house to teach employees how to exploit them. Similarly, Panhandle Eastern's Haskett reports that training programs are being written not only for management but also for support personnel and field-workers.

Clearly, success with management training software will have effects beyond encouraging more effective management practices. Managers, seeing their own performance improve because of their work with these packages, have begun to insist that CAI software be developed for all echelons of their companies. The bottom line is increased productivity.

One begins to see a pattern emerg-

ing as the new types of teaching software begin to prompt American business to re-examine itself. This is so because the message in all such programs is that a "win-win" strategy is the most effective. For example, both Human Edge and Thoughtware emphasize that positive feedback is fundamental to effective management. By its nature, positive feedback is the hallmark of a good interactive computer program. Users of Cdex packages and other tutorial programs such as The Instructor by Individual Software are experiencing first-hand

*Managers have begun
to insist on CAI
software for all
echelons of their
companies.*

the value of immediate, relevant feedback.

American society is already heavily dependent on information technology in general, and, with growing acceptance of CAI among business leaders, this dependence will increase more rapidly in educational practice. Almost certainly, this dependence will have significant educational and psychological effects on the American population at-large.

No one yet seems to know what those effects might be. Although the educational effectiveness of CAI seems to be generally accepted, not much has been learned about the more subtle effects on learning or the possible impacts of more extensive, longer-term use. As with previous developments in technology. Some skills may be enhanced while others may be lost or decreased in importance.


As these changes occur, the skills demanded by society are changing as well. As facility with arithmetic has already become less important with

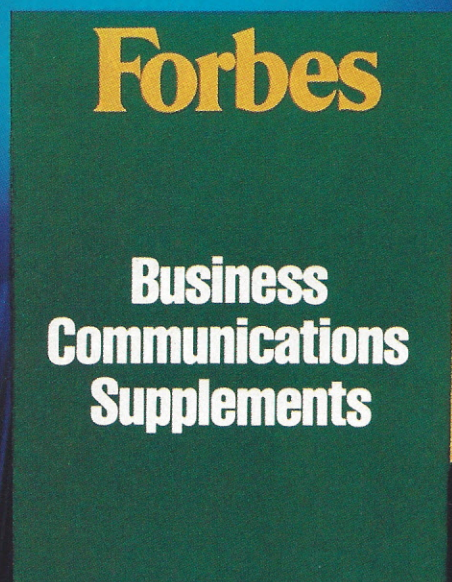
the general acceptance and reliance on hand-held calculators, the increased use of word processing systems that correct errors is diminishing the importance of spelling. More importantly, as more and more positions require the use of computers and automated data bases to solve problems, the skills that are particularly enhanced with a computer-based education system will become increasingly important in the future.

Fighting temptation

There is certainly a down-side possibility. As Panhandle Eastern's Haskett puts it, "users of CAI have to fight the temptation just to follow the cues without thinking for themselves." The obvious danger is a complacency that is not likely to be the breeding ground for stimulating individuals or the kind of innovations that the United States needs to stay in the forefront of technology development.

But the positive side seems more likely. When you get down to it, the basics of management theory are pretty simple. Human Edge does a very good job of summarizing the main points in about 40 pages. Human Edge and Thoughtware perform a service in demystifying management practice and providing software that can be put to immediate practical use by individuals. The most important point that these programs teach is that good management begins with good self-management. And their interactive character enables the individual user to improve his self-management skills. From this point of view, such programs can be seen to have wide applicability.

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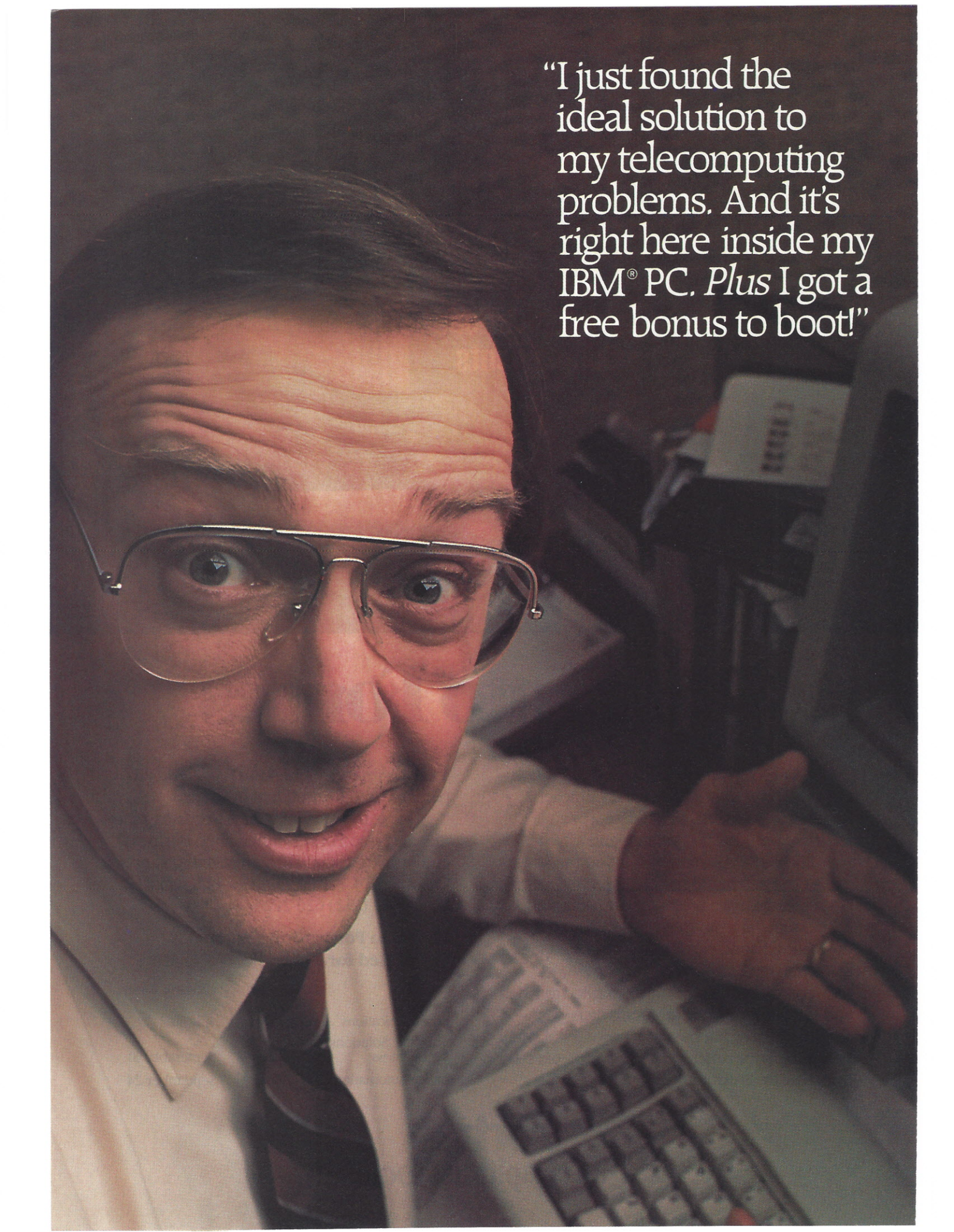
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CIRCLE 74

A man with dark hair and glasses, wearing a white shirt and a dark tie, is smiling and looking directly at the camera. He is sitting at a desk with a computer keyboard in front of him. His right hand is resting on the keyboard. In the background, there is a computer monitor and some papers. The lighting is warm and focused on the man's face.

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CIRCLE 79

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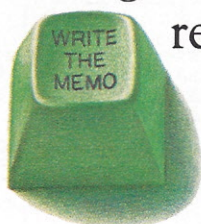
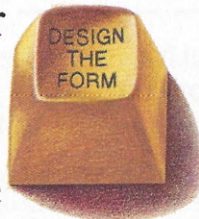
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☐ CIRCLE 32 ☐

ComputerLand's William Millard: Persistence Pays Off

Back when personal computers, or microcomputers as they were called, were largely toys for hobbyists William Millard had a vision. He saw the exciting potential for personal computers and the need for a chain of retail stores that would sell computers to the everyday consumer. That vision became ComputerLand, now a chain with annual sales at the billion dollar level and one which dominates its chosen field.

Because of ComputerLand's rapid growth, this spectacular success seemed to happen overnight. But like many overnight successes ComputerLand is the result of years of struggle. Bill Millard tried

repeatedly to get his own business off the ground before finding the right formula for success.

In 1958 Millard was a successful branch manager for a finance company when he was asked to apply for a position with Univac computers, a division of Lockheed. Five hours of tests were put on punch cards, screened by the computer and Millard entered the computer age as a member of one of the first data processing departments.

After stints running a data processing department for a county government in California and selling for IBM, Millard was bitten by the entrepreneurial bug that infects so many people in Silicon Valley. His



Photograph by Larry Williams

first venture was a classic case of bad timing. Millard started a software company in 1969, which he equates to entering the stock market in 1929.

Millard and his wife found themselves in debt, having borrowed against their home to launch the software company. In May 1972 they finally had to close up shop. Millard then formed a one-man company called IMS Associates and started doing custom engineering, designing one-of-a-kind hardware and software projects under contract to a variety of companies. Struggling between "bare survival and utter failure," IMS limped along until 1975 when Millard "made a horrendous mistake" by taking on a contract

IMS couldn't complete within budget. Struggling desperately to come up with a solution, IMS turned to a brand new integrated circuit, Intel's 8080 microprocessor. Intel intended the 8080 to be used in intelligent terminals, but IMS's engineers saw the potential to do complete data processing functions.

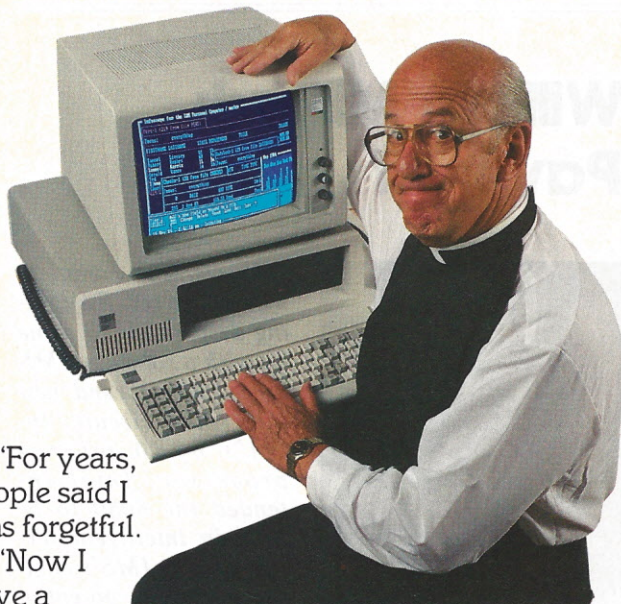
Then fate intervened. A technician brought in the January 1975 issue of Popular Science featuring the MITS Altair computer. This kit computer was based on the same 8080 chip as IMS's designs, so Millard and company made a tentative step into the kit business. The results were stunning. A small advertisement elicited

3500 responses. Even more amazing for a company struggling with cash flow problems, people sent in checks before the product was even delivered. The result was the IMSAI computer.

Although the IMSAI has assumed its place in history, it still wasn't enough to save IMS. The company filed for bankruptcy in 1978. ComputerLand emerged out of the ashes.

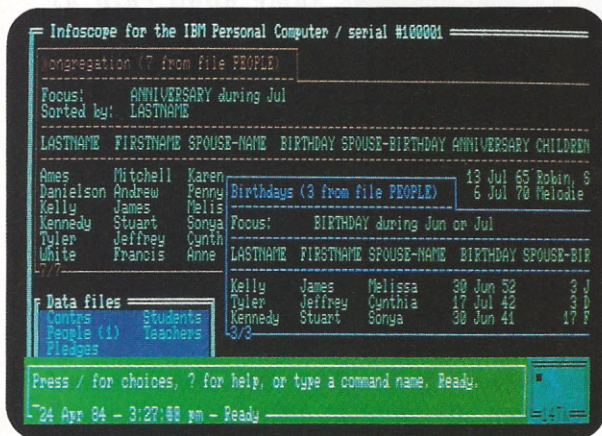
Finally, Millard had the right idea at the right time. At the time, computer stores were "pretty grim places, typically in abandoned grocery stores with hand-lettered posters on the wall," as Millard describes them. But he quickly realized the potential for a competent retail chain

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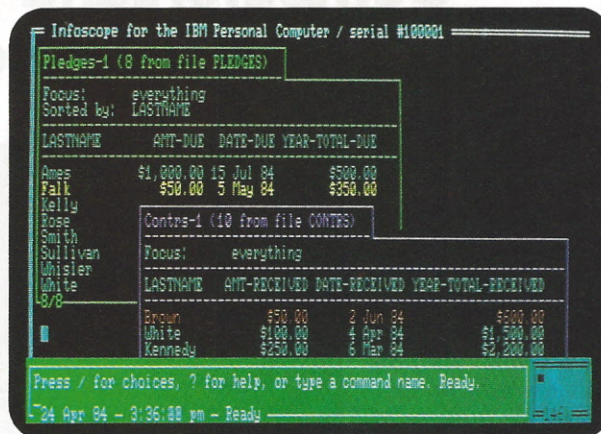
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"Then there are the windows. I can create a dozen of them, any size, any part of the screen ... and display a different set of information in each one. It makes it easy to compare things — like building fund pledges compared with contributions.

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to spread MacDonalds-like across the land. ComputerLand rang up \$9 million in sales in 1983 and, for the sixth consecutive year, is expected to double sales in 1984.

Here Millard shares his views on a wide variety of subjects, from the impact of personal computers on the productivity of American business, to continued prospects for growth and use of personal computers, to doing business internationally in an exclusive interview with Personal Computing's editor, Charles Martin, and executive editor James Fawcette, conducted at his home and at ComputerLand's corporate headquarters in Oakland, California.

Growth of both your company and the use of personal computers in general has been dramatic, but can this level of growth be sustained?

Millard: The environment is dynamic, it is healthy and it is expanding constantly. Unlike any other industry I can name or remember, I predict that the computer industry will only expand.

But isn't there a saturation point?

Millard: No.

Why not?

Millard: There are only two ways that human beings can grow and expand. One is mechanically, physically, if you will. The other is mentally. If you view the computer as being one way we multiply ourselves—enhance ourselves mentally—I don't see there ever being an end to that. We are going to be striving to do it a thousand years from now.

How can we define the contribution personal computers are making to America? Can you put that contribution in concrete terms?

Millard: First of all let's understand what I mean when I talk about the act of personal computing. Some 85 percent of all ComputerLand sales are to the business and professional community, so for this discussion at least I'll exclude the so-called home computer.

We regard personal computing as an individual's involvement with and use of a personal computer, whether that takes place at home or in the office.

Millard: Fine. One person, one computer. That's pretty much how I see it. By that definition personal computing is affecting every aspect of American life that I can think of and I believe its impact is many times what anyone thinks it is. Many times.

According to one estimate there were a million personal computers installed by the end of 1982 and another

“Personal computing is affecting every aspect of American life I can think of.”

million installed in 1983. If you look at this industry by its sales alone you might say its impact on America was, let's say, \$3 to \$5 billion. Another approach is to recognize that these machines were used to do research to build buildings more efficiently and to do thousands of jobs more effectively. Let me share with you the arithmetic of a perception I have, using some rough ballpark numbers.

If you take a million machines and assume that each is used for 20 hours a week, that comes to 1000 machine-hours a year per machine. Now, let's take any value you want, let's say one productive hour on a personal computer equates to 10 hours without it. Now that is 10 billion man-hours per year on just one million machines. Now give me an hourly value, say \$10 an hour average for labor, this yields \$100 billion as the contribution of personal computers to America's productivity. And the best part is that this was the contribution in 1982. In 1983 those machines were still out

there working so you now have the machines installed in 1982 plus the machines installed in 1983.

How does this contribution by personal computers affect the relative position of other countries?

Millard: I've met with leaders in China, in India and around the world. They say that not only are their countries not catching up, but they are falling farther behind. Numbers aside, there is a determination to get their own industry, their own domestic industries started. I've told them that the time they spend producing their own computers is time they spend not using computers purchased abroad. It's time that puts them farther behind.

But the net is that personal computing is generally regarded as a \$3 to \$5 billion industry, which ignores 94 percent of the industry's contribution.

You've recently returned from China where you negotiated a joint venture to set up computer stores there. What is your arrangement with China?

Millard: We really achieved a breakthrough. I'm excited by their willingness to enter into a joint venture of this magnitude. Essentially what they and we intend to do is bring the ComputerLand concept intact to China. At one point it seemed inconceivable that we could introduce a business that is based on entrepreneurial drive into the Chinese economic structure. That we are now on the verge of doing this is truly remarkable.

What is ComputerLand China and how will it operate?

Millard: ComputerLand has been a global concept since its inception. We have corporate headquarters in five locations: Oakland, California; Sydney, Australia; Arlon, Luxembourg; Toronto, Canada; and Tokyo, Japan. Number six will be in Beijing.

After so much early promise, American industry has had a great deal of difficulty doing business with China. Talks seemingly go on forever with-

out ever being resolved. How were you able to bring these discussions to a positive conclusion and what does this imply for the future of doing business with China?

Millard: This is the first time China has ever opened its doors to marketing and retailing. The key simply was honest commitment. We are committed to a relationship that means a win for China and a win for ourselves. That may sound trite but that is it. We started the dialogue 18 months ago and kept the U.S. government fully informed. The Chinese are extremely interested in using computer technology. And we are not in China only to take, but to participate. We are looking at a 100-year relationship. The Chinese are open and show a willingness to do whatever works without regard to prior concepts.

Financing has been a major hang up in business negotiations with China. How will they pay?

Millard: All our external costs will be covered in dollars, internal costs will be paid in Yuan.

What will your joint venture be doing beyond importing products and when will we see Chinese-built computers in American stores?

Millard: We will sell Chinese computers in China's ComputerLand stores and as soon as they have a world-class product we will distribute that product elsewhere.

Turning from one giant on the international scene to an entirely different giant whose products you may also be carrying, what impact do you expect AT&T's entry into personal computers will have?

Millard: AT&T brings a number of assets to this market. They definitely have a shot at being second in the market, although they may well intend to be first. Their major role could be in bringing together voice and data. AT&T could be as effective in that as anyone. AT&T has an immense R&D function and a commitment to the market. They understand field support and have a strong

support organization. Also, they will benefit from their retail experience with their phone stores.

Will we see the AT&T Personal Computer in ComputerLand stores and will you be carrying other AT&T products?

Millard: We've agreed to do business. I expect no problems. As for other products—we're looking very hard at that. As the telephone becomes more and more like a computer and the computer more and more like a phone we'll have to look at that area.

What does the merger of communications and personal computing technologies promise?

Millard: I see this convergence as doing two simultaneously conflicting things. First, intensifying competition for the general personal computer market and, second, causing the market to explode by expanding the diversity of applications. AT&T's entry could bring in the synthesis of voice and data that will incrementally increase the velocity of expansion and increase diversity in the market.

What growth rate do you anticipate for sales of personal computers?

Millard: The projections I've seen are 40 percent compounded annually for the next five years. I expect no less than that. If I personally was going to shoot for a bull's-eye I'd predict 50 to 60 percent per year compounded annually in the next five years.

How will all those computers be used?

Millard: Remember that great line in the book "2001: A Space Odyssey"? The last line of the book? It started with the apes in the presence of the monolith and there was this moment when there was the realization about the use of a bone as a tool. As the story progresses man goes to Jupiter and again sees the monolith and suddenly realizes the awesome nature of his abilities and answers the question: What will I do with these abilities? With, in effect, I will think of something. That is really my answer.

That's a philosophical view which is

easy to assume sitting here with a large chain of stores that sells these things, but how does the day-to-day businessman who is simply looking to increase what he does at work apply personal computers?

Millard: I'll give you an example. If you go through ComputerLand you can see how computers are used. I doubt if there is anywhere in the world that you'll see personal computers used more and the same is true in our stores.

Personal computers are used extensively for number crunching, largely by middle managers. What capability has to be added to get personal computers on the desks of company presidents?

Millard: Yes. Well, let me show you what I'm interested in as a CEO. First of all my calendar. But a conventional binder is an attractive simple alternative. Perhaps more importantly there is the area I call commitment tracking. There is some very fine work being done exploring the subject of how to make organizations more effective. It starts from the perspective that an organization is an unbroken chain of requests and promises. There is work being done to implement an interactive or communication system that will literally link those requests and promises in a simple way. I think this whole subject is an area that we will see emerge, but it may take five to 10 years.

Is this then a sort of a synthesis of networking, project scheduling and a calendar?

Millard: Exactly. If I could just walk in here and see exactly the status of all of my personal requests and promises with prompts that are timely and would allow me to be more responsive. Now what that will look like I don't know as computers and telephones merge. But it will fundamentally be a tool that allows us to be more responsive and to improve the quality of what we do or produce more of a given quality for less.

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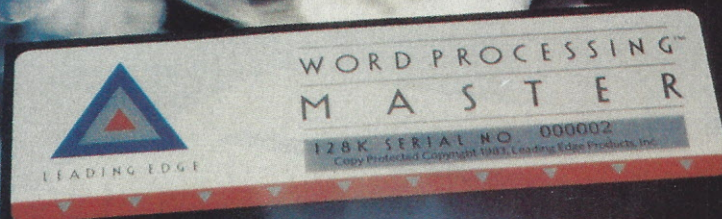
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